ON

SERPENT-WORSHIP

AND ON

THE VENOMOUS SNAKES

OF

INDIA.

BY

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ON SERPENT-WORSHIP AND ON THE VENOMOUS SNAKES OF INDIA AND THE MORTALITY CAUSED BY THEM. By Sir Joseph Fayrer, K.C.S.I., LL.D., M.D., F.R.S. March 8. 1892

THE serpent is the ancient enemy of the human race, and it is still held in antipathy, not only by man, but by the lower animals. In man, this is probably due as much or more to the lethal properties of some forms, as to the repulsiveness of their aspect generally; while animals seem to be instinctively imbued with the dread of them. The destructive qualities, albeit the property of but few members of this large order, have come to be attributed so universally to all, that the innocent are classed with the guilty, and the harmless creature which undulates so gracefully through the grass, is popularly associated with the deadly cobra or rattlesnake.

But although dread of their baneful properties may lie at the root of the repugnance in which they are held, yet with this feeling, no doubt, has been mingled a sentiment of veneration for their supposed wisdom and supernatural power, which, combined with fear, originated one of the earliest forms of worship, in which superstition and religious feeling have found expression, for coeval with the worship of trees, the heavenly bodies, and other natural objects, we find that ophiolatry has been general throughout the world from the remotest antiquity.

Serpent-worship, according to Fergusson,* is characteristic of the Turanian races, and is rarely to be found among Aryan or Semitic peoples. There is no mention of it in the Old Testament from the formation of the Jewish nation, unless the raising of the Brazen Serpent be so considered, but six centuries later, Hezekiah "brake in pieces the brazen serpent that Moses had made; for unto those days the children of Israel did burn incense to it; and he called it Nehushtan," 2 Kings xviii, 4 and 5. Between these periods there is no other mention of it in the Old Testament, but in the book of the Wisdom of Solomon, xi, 15, we read, "They worshipped serpents void of reason"; nevertheless its revival among the Gnostic sect of the Ophites points to the fact that the notion was not extinct. "A wondrous blending of the ancient rites of Ophiolatry with mystic conceptions of Gnosticism appears in the cultus which tradition (in truth or slander) declares the semi-Christian sect of Ophites to have rendered to their tame snake, enticing it out of its chest, to coil round the sacramental bread, and worshipping it as representing the great king from heaven, who in the beginning gave to the man and woman the knowledge of the mysteries" ("Primitive Culture," Tylor).

Serpent-worship, according to Fergusson, has prevailed to a greater or less extent nearly all over the world.

In America it was known in Peru, Mexico, and among the Red Indians, according to ancient records of the United States.

Its prevalence in Western Asia seems doubtful, except in Judæa, to a slight extent in Phœnicia, and in the Troad, among the so-called Ophiogones.

As regards Europe, there are next to no traces of its prevalence among the Germans, though Tylor refers to the "Prussian serpent-worship and offering of food to the household snakes," nor among the Gauls nor Britons. Ophiolatry is said to have been practised by the Druids; according to Fergusson there is not much evidence of this, but other authorities state that the serpent's egg was the Druids' crest, and that the serpent was entwined at the foot of their altars. At Avebury in Wiltshire, there existed the figure of a serpent in stones extending for two and a half miles, of which the head and tail are still obvious. There are traces of it in

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* To Fergusson's "Tree and Serpent-Worship," and Tylor's "Primitive Culture," I am indebted for much information.

Scandinavia and on the east coast of Scotland, north of the Forth, where sculptured stone monuments have been found on which the serpent appears frequently, and as a prominent figure.

In Greece the temple of Æsculapius was a centre of serpent-worship, whilst the Æsculapian rod symbolises wisdom. In this, as in other cases, the serpent was the symbol of the god, rather than itself the god.*

In Italy the serpent was often represented as the *genius loci*, but there is no direct evidence that beyond this the Romans ever worshipped it. Dante, in his "Inferno," ascribes to the serpent supernatural power, his bite causing a man to be reduced to ashes:—

"Ed ecco ad un, ch'era da nostra proda,
S'avventò un serpente, che'l trafisse
Là, dove'l collo alle spalle s'annoda.
Nè O si tosto mai, nè I si scrisse,
Com' ei s'accese, ed arse, e cener tutto
Convenne che cascando divenisse."

(Inferno, xxiv, 97.)

It probably prevailed in Eastern Europe during the Middle Ages, and in Esthonia and Finland up to a comparatively recent period.

In Africa, Fergusson says that Sheikh Harcdi in Upper Egypt is one of the best known sites of modern serpent-worship, but there are very slight traces of its prevalence in ancient Egypt. The Egyptians worshipped many animals, but there is nothing to show that the serpent was honoured above the rest.

In Abyssinia it was worshipped before the introduction of Christianity in the fourth century, and on the Guinea coast serpent-worship flourishes at the present day, and possibly has done so for the last 4,000 years.

In Eastern Asia, Persia affords but slight traces of it. The Iranians were Aryans, and brought with them fire-worship. It may have existed among their predecessors.

Cashmere was one of the principal centres of it. There is no direct testimony of its existence there till a century before the Christian era, and the latest authoritative notice of its practice was in the reign of Akbar (fourteenth century).

In Cambodia and the adjacent countries, serpent-worship reached its fullest development. The country was conquered

* For instance, when a pestilence was raging in Rome in 291 B.C., the god was brought in the form of a serpent from Epidaurus. A sanctuary was built for him on the Tiber Island.

by the Siamese in the middle of the fourteenth century, and since then it has given place, to a great extent, to Buddhism.

It prevailed also in Ceylon till the island was converted to Buddhism, in the third or perhaps the sixth century, and there are traces of it there still.

In China there are only slight traces, but the repetition of the dragon-like forms in connection with temples, pagodas, &c., in China and Burma, is suggestive of something akin to the ophidian worship.

In India it was not noticed before the Mahabhrata, but in that is mention of the Nagas, the great serpent-worshipping race, who, taking the serpent as their emblem or cognizance, came to consider themselves the descendants of serpents. There are tribes in India called Nagas at the present day.

Ophiolatry in a modified form still prevails in many parts of India. It is met with in Manipur, Cashmere, Sumbulpore, Nepaul, in many parts of the Deccan and Southern India. On the festival of Nag-Panchmee, snakes are worshipped by most of the lower tribes of the Deccan.

Serpent-worship has no place in Brahminism, but the Hindus of the present day, if they do not directly worship the snake, will neither injure nor kill, but rather propitiate it. This feeling may be as much due to fear of any bodily harm it may do them, as to the idea of its possessing supernatural powers. Tylor says the serpent has been taken as the symbol of the world, of the Taaut, or heaven-god of the Phœnicians, and as the emblem of eternity; in the latter case it is depicted with its tail in its mouth. It may have been the personification of evil in the Apophis serpent of the Egyptian Hades, and it was so in the wicked serpent of the Zoroastrians, Aji Dahaka; Ajdaha is still applied to the larger constricting snakes. Sir George Birdwood tells me that besides abstract evil, Aji Dahaka symbolised death, destruction, the storm cloud, &c. "There Ingromaniyus (Ahriman) the deadly created a mighty serpent, and snow, the work of Deva." *Cyclopædia of India* (Balfour). He also reminds me that the deadly serpent is the symbol of evil in all Eastern countries, though there, as in Greece and Rome, it may have had also a creative symbolism.

But time does not permit that I should dwell longer on this exceedingly interesting subject; I must rather describe to you those forms of the serpent in which the lethal attributes exist in their most marked conditions, producing fear and repugnance, if not the worship of olden times.

The cobra, as I have said, is an object of veneration and superstitious awe to the natives of Hindustan, for in a religion that depreeates the wrath of a cruel and relentless power whieh it desires to propitiate, the symbol of evil represented by this reptile is naturally regarded with peculiar deference. The rapidity and deadliness of its poison, and the large death-rate due to its bite, explain these feelings, which need cause no surprise when it is remembered that upwards of 20,000 people die yearly of snake-bite alone.

I shall give you a brief aecount of the most interesting forms of venomous snakes, confining myself to those that are found in our Indian Empire. It would be barely possible even to enumerate in the time at my disposal, the deadly snakes of other countries, or the innumerable innocent forms.

Wherever climate and other conditions are favourable, snakes are likely to be found, the most venomous as well as the greatest numbers in hot and tropieal regions. In our own island, as well as in most parts of Europe, the eommon adder is the only venomous snake, and its power is feeble compared with that of the snakes of India, the West Indies, Tropieal America, Afriea, and Australia.

The order Ophidia is divided into Colubriform and Viperiform; the first are both venomous and innocuous, the seeond are all venomous. Both are numerously represented in India; the eolubriform has five genera of *Elapidae*, and four of *Hydrophidae*, the viperiform has two genera of *Viperidae*, and four of *Crotalidae*, making fifteen poisonous genera, which comprise a large number of speeies, but this is small compared with the number of innoeent eolubrine snakes.

The most widely distributed venomous snakes are the viperiform; America and Afriea abound in them; the *Crotalidae* are most numerous in America, the *Viperidae* in Africa, whilst poisonous colubrine snakes are most numerous in Asia.

The Ophidia are cold-blooded vertebrata, destitute of external skeleton, peetoral areh, sternum, or limbs. In a few there is a rudimentary pelvis and hinder extremities.

The body is eovered by a deciduous epidermis and scales, These, with some exceptions, assume on the head and abdomen the eondition of seutæ or plates. The bones of the mouth are eonneeted by ligaments, which allow of great distension, thus enabling the ereature to swallow prey larger in diameter than itself.

In snakes, one lung is much larger than the other. Their

circulation of mixed arterial and venous blood is regulated by a heart, consisting of one ventricle, and two auricles. Locomotion is effected in the terrestrial forms by the motion of the numerous ribs, which are connected indirectly with the abdominal scutæ. These act as feet, and aided by the undulations of the body, grasp the surface, thus effecting the rapid movements of which a snake is capable. The pelagic serpents swim like fish, motion being effected by the undulations of the body and of the fin-like tail.

Snakes have neither external ears nor eyelids; the eye is protected by a transparent capsule, which is shed with the epidermis. The approach of moulting is indicated by diminution in the brilliancy of the colouration, and a pearly opacity of the eye; the creature itself becoming more or less apathetic until the process is completed.

The scales and scutæ form the basis of classification. Those on the head are named as follows :—

Rostral.	Præ, Post } Orbitals.
Anterior, Posterior } Frontals.	Upper, Lower } Labials.
Vertical.	Temporals.
Supra-ciliary.	Mental.
Occipital.	Chin-shields.
Nasals.	
Loreal.	

The form and arrangement of the scales vary. In some snakes they are plain and lie side by side, more or less lanceolate in form. In others they are imbricated, that is they overlap each other. On the head, in some snakes, they are arranged as large plates or shields. On the abdomen in the land snakes, they are in transverse plates for the purpose of locomotion. In the *Hydrophidae* and burrowing land snakes these are absent.

Snakes are oviparous and viviparous; the colubrine, except the pelagic forms, for the most part belong to the first class, the viperine to the second. The cobra lays twenty to thirty white, leathery eggs, which are hatched in some warm place by natural heat. Some are said to incubate; the python is said to coil itself round the eggs until they are hatched. The female of all snakes is said to be larger than the male; there are slight differences in colour and form, but no other external distinction.

Snakes hybernate in the cold, but returning warmth rouses them into activity. They generally eat living creatures, but

some will eat eggs—the cobra robs the hen roosts, or devours insects, molluscs, and even, it is said, vegetable matter; and some are cannibals—the ophiophagus and callophis live on snakes. In captivity they will, it is said, drink milk.

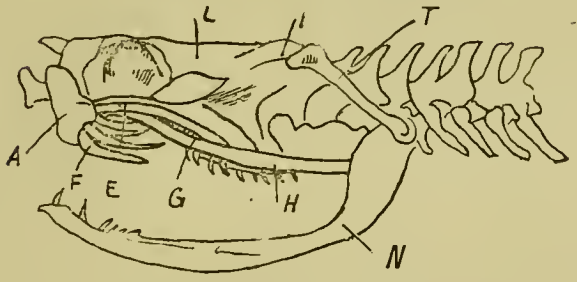
Snakes differ in their habits and modes of life, and are grouped accordingly. Tree and grass snakes live in the trees, bushes, and grass, and are often coloured like the vegetation they frequent; their tails are prehensile. When slender, they are called whip snakes; innocent and poisonous forms are found among these. Ground snakes are found in all three sub-orders; the great proportion belong to this group.

Burrowing snakes live much under ground, have a rigid, cylindrical body, short tail, narrow mouth, small teeth, and are all innocent.

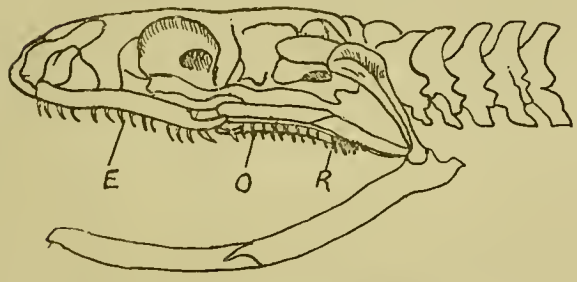
There are fresh-and salt-water snakes. The salt-water snakes are adapted for an aquatic life, and are venomous; the fresh-water snakes have not the same characters as the *Hydrophidae*, and are innocent—a curious fact! The *Hydrophidae* are viviparous.

I.

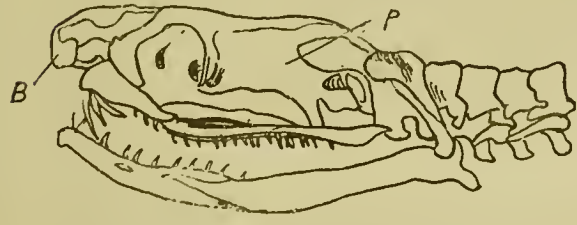
Viperiform (*Daboia Russellii*).



Innocent (*Ptyas Mucosus*).



Colubriform (*Naja tripudians*).



A Maxillary bone.
B Intermaxillary bone.
E Maxillary teeth.
E′ Ecto-pterygoid bone.
F Poison fang.
G Palatine bone.
H Pterygoid bone.
L Frontal bone.
M Mastoid bone.
N Mandible.
T Tympanic.
O Palatine teeth.
P Parietal bone.
R Pterygoid teeth.

Deglutition is effected in a peculiar way; the prey being seized, the mouth gapes laterally and vertically, each side of the jaws is called separately into action; the sharp and recurved teeth hold the prey firmly, as each side of the jaw alternately advances or relaxes its grasp, and it is thus gradually but inevitably engulfed.

The maxillary bones in the venomous snakes are much shorter, and provided with fewer teeth than in the innocent. In the latter, they are elongated slips of bone set with small recurved teeth. In the poisonous colubrine snakes they are less elongated and have a fixed, large poison fang, several loose, reserve fangs, and one, two, or more fixed smaller teeth, not directly connected with the poison apparatus. In the *Viperidae* the maxillary bone is a short, triangular, movable wedge, furnished with a poison fang lying hidden in the mucous sheath. The movements of the fang are due to the rotation of the maxillary bone. This mobility is great in vipers, whilst it is slight in the colubrines.

When the fang is reclined or erected, the maxillary bone into which it is inserted is pushed by the external pterygoid bone, a movement which is effected by muscular action. The muscular arrangement for opening and closing the mouth at the same time compresses the poison gland, thereby injecting the venom through the tubular fang. The fangs are shed at intervals, and to supply the loss, the reserves are provided. These lie in the capsule of mucous membrane which ensheathes the fang. The fang is, during development

II.

Cobra di Capello (*Naja Tripudians*).

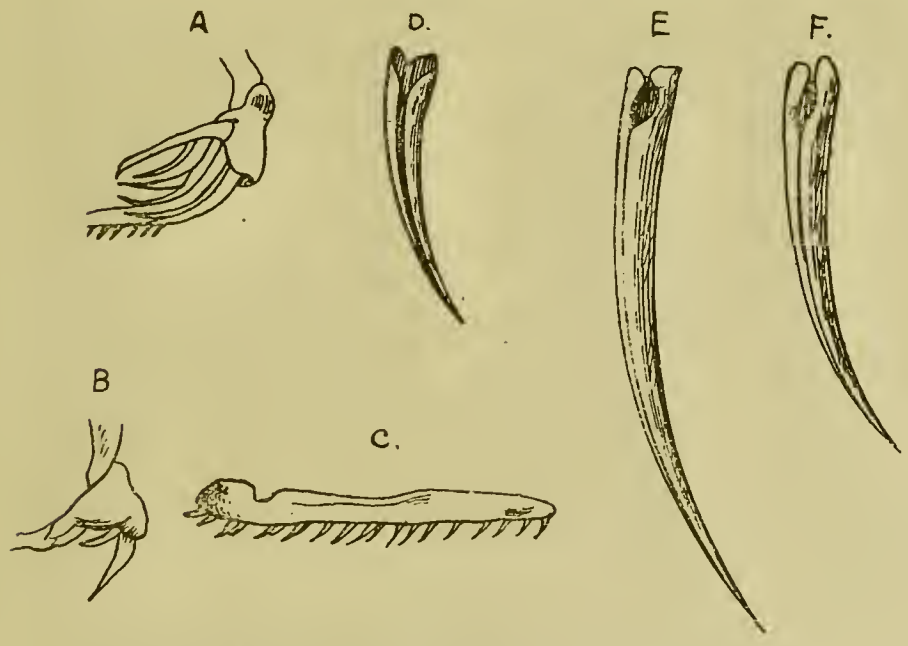
A Poison gland.
B Duct.
C Fang.

folded on itself so as to form a tube. It is along this channel that the poison passes; when the fang is deeply imbedded the quantity of virus injected is considerable, and its effects are rapidly manifested.

The poison glands are situated between the orbit and the tympanic bone; they are composed of lobes and lobules, which having secreted the virus, transmit it under muscular pressure through a duct which communicates with a triangular opening at the base of the fang. They are of various forms and sizes; in *callophis* they are much elongated; in the cobra they are of the size and something of the shape of a small almond.

The virus is a transparent, slightly viscid fluid, faintly acid in reaction, of a straw colour—in the ophiophagus, of a yellow colour; when dried it forms a semi-crystalline substance, like gum arabic. It is secreted in considerable quantities, and if a fresh, vigorous cobra be made to bite a leaf stretched across a tea-spoon—or as the natives do it, a mussel-shell, several drops may be obtained. The poison

III.



A Maxillary bone and fangs of Daboia Russellii (viperiform).
B „ „ „ Naja tripudians (colubriform).
C „ „ teeth of Ptyas mucosus (innocent).
D Fang of Hydrophis.
E „ Daboia.
F „ Naja tripudians.

is exhausted when the snake has bitten frequently, but is rapidly reformed; in the interval the reptile is comparatively harmless, but soon becomes dangerous again. A vigorous cobra can kill several creatures before its bite becomes impotent. Removal of the fangs renders the snake temporarily harmless.

Some animals, especially the pig and the mongoose, are supposed to have immunity from snake-bite; fat sometimes protects the former, the latter is so wiry and active that it frequently escapes with only a scratch; but, if either of them be fairly bitten in a vascular part, it succumbs like any other animal.

The chemistry of snake-poison has been studied by Fontana, by Prince L. Bonaparte, Armstrong, Gautier, and others, and recently by Drs. Weir, Mitchell, and Reichert, of the United States. It is a most virulent poison, and may neither be sucked from a bite nor swallowed with impunity. It acts most rapidly on warm-blooded, but is also deadly to cold-blooded creatures, and to the lowest forms of invertebrate life. Strange to say, a snake cannot poison itself, or one of its own species, scarcely its own congeners, and only slightly any other genus of venomous snake; but it kills innocent snakes quickly. Snake-poison kills by extinguishing the source of nerve energy. It is also a blood poison and irritant, and causes great local disturbance as well as blood change. If it enter by a large vein, life may be destroyed in a few seconds. The chief effect is on the respiratory apparatus, and death occurs by asphyxia; but general paralysis is also a result. The phenomena of poisoning vary according to the nature of the snake and the individual peculiarities of the creature injured, the chief difference being observed in viperine, as contrasted with colubrine poison. The latter is a nerve-poison of great deadliness; as a blood poison its results are less marked. Viperine poison, on the other hand, is a more potent blood-poison.

Adder poison is of the viperine character, and though its immediate effects as a nerve-poison are feeble, yet those on the blood and locally on the tissues may be productive of serious symptoms.

It is impossible to enumerate all the antidotes that have been reported beneficial; but amongst those that have the greatest repute may be mentioned arsenic, ammonia, alcohol, quinine, strychnine, acids, snake poison itself, snake-bile, and the snake-stone, so much relied on in India.

These stones are said to attach themselves closely to the bitten part, the blood that oozes out being rapidly absorbed, and when it drops off the bitten person is thought to be out of danger. Faraday said that these are pieces of charred bone. There may be a fragment of truth in the supposition that they are of use, because in absorbing the blood, they must also absorb some of the poison, though so little that their efficacy must be a mere delusion.

Experience shows that so far no physiological antidote to snake-virus is known, and that, when the full effect is produced, remedies are of little avail; but when the poison has entered in smaller quantities, medical treatment may be of service.

The entry of the poison into the system should be arrested, if possible, by a ligature above the injured part; next the poison in the wound should be destroyed or removed by excision or by burning, and the application of potassium permanganate. The subsequent treatment is conducted on ordinary medical principles, of which further details would be out of place here.

I must now describe the principal venomous snakes of India. The *Elapidae* are subdivided into *Najadæ* or hooded snakes, and *Elapidae* proper, which are not hooded. *Najadæ* has two genera, *Naja* and *Ophiophagus; Elapidae* has three, *Bungarus*, *Xenurelaps*, *Callophis*.

Naja includes the several varieties of cobra, which are all of one species, though differing considerably in external appearance.

The cobra di capello (*Naja tripudians*) has numerous synonyms in different parts of India. A common general native term is kala nag or kala samp. There are many varieties, and they are considered by natives to be of different degrees of activity or deadliness; but the probability is that any difference is due to temporary or individual causes.

The cobras are all hooded, bearing on the hood a spectacle mark, or a single ocellus, or no mark at all; this hood is caused by the expansion of a certain number of elongated ribs. The body and tail are relatively of moderate length, seldom together exceeding five or six feet, more frequently three or four feet. The scales are smooth and imbricated; there is no loreal shield, the nostrils are lateral and the pupil is round. The colour generally is from a light chocolate, speckled, to a dark brown or even black. The head is short, and not very distinctly separated from the neck; the fangs

are of moderate size and but slightly movable; there are one or two small teeth behind them in the maxillary bone.

Cobras are most active in the night, though often seen in the day. They will live weeks, even months in captivity, without touching food or water. They go into water readily, but are essentially terrestrial snakes. They occasionally ascend trees in search of food, and are not infrequently found in holes in walls, old ruins, fowl-houses, and among stacks of wood, cellars, old brick-kilns, old masonry of brick, or stone, or mud, among the grass or low jungle: such are the common resorts, and during the rains and inundations they collect in such places of refuge, where men, stepping on, or unintentionally disturbing them, mostly in the dark, are bitten.

The cobra sheds the epidermis with the outer layer of the cornea frequently, the fangs also are shed. The entire slough is often marked by a single rent, through which the creature has emerged, brightly coloured and glistening in its new epidermis. It aids the process of exfoliation by friction against some hard substance, such as the branches of a tree, a stone, or the like, the cast off epidermis being often found in fragments. It is oviparous, the eggs are about the size of those of a pigeon, and the shell is white, tough, and leathery.

The cobra is found all over Hindustan, up to a height of 8,000 feet. It is equally dreaded and fatal wherever met with; fortunately it is not naturally aggressive unless provoked, then raising the anterior third or more of its body, and expanding its hood, with a loud hissing it draws back its head prepared to strike, darts forward and scratches, or imbeds its fangs in the object of attack. In the latter case, the results are often dangerous and fatal, but if the fangs only inflict a scratch, or if the snake be exhausted, the same danger is not incurred. If the poison enter a large vein and be quickly carried into the circulation, death is very rapid. Men have been known to perish from a cobra bite within half an hour. The largest and strongest, as well as the smallest and weakest creatures succumb. Fortunately all who are bitten do not die. In the first place some human beings as well as lower animals have greater tolerance than others; or a wound may have been inflicted and yet but little of the poison inoculated; or in the third place, the snake may be weak or sickly, or it may have been exhausted by recent biting, and thus have become temporarily incapable of inflicting a fatal wound, though it may still poison. But when a cobra in the full possession of its power bites and injects the

poison into man or beast, it is almost surely fatal, and all the vaunted antidotes are futile.

Cobras are frequently exhibited by the so-called snake charmers. Their graceful attitudes, with raised heads and distended necks, as they sway from side to side watching the movements of their keeper, and frequently striking at him, and the ease with which they are handled, make them general favourites. I may here remark that the cobra depicted in Hindoo legends or old paintings is the gokurrah, or spectacled snake. They are generally deprived of their fangs (which is done by cutting them out with a coarse knife), but the snake charmers know the habits of the creature so well that they handle them without fear, even when armed, though with great caution, always grasping them tightly below the head with one hand and holding the tail with the other. They know that a new fang is soon produced, and to prevent this they sometimes remove the capsule and reserve fangs, thus making the snake permanently harmless. The sole secret of these men lies in their dexterity and fearlessness. Their *muntras*, their antidotes, and the pipes with which they pretend to charm are as devoid of real power over the snake as are the snake-stones, roots, and other nostrums over its poison. They know that dexterity is their real security.

The snake-charmers occasionally exhibit the ophiophagus, —which, like the cobra, dilates the hood when excited—also the bungarus, daboia, and some of the innocent snakes, such as *Chrysopelia*, *Passerita*, *Ptyas*, and *Erix*, which are remarkable for the beauty of their colours, their activity, or their peculiarity of form. These exhibitions are always accompanied by the music of the pipes.

The cobra is an object of superstitious awe to the Hindus. Should fear or the death of some inmate of the house in which the cobra has taken up its abode prove stronger than superstition, it may be caught and deported in an earthen jar to some field, where it is allowed to escape, but not destroyed. Still the cobra has many enemies. Besides by its natural foes, such as the mongoose (*Herpestes*), pigs, rapacious birds, and other creatures, numbers are destroyed by low caste people for the sake of reward. But still the loss of human life is great.

The *Ophiophagus elaps* (Hamadryad, Sunkerchor) is one of the largest venomous snakes. It attains a length of ten or twelve feet, is very powerful and active, and is said to be aggressive; it is hooded like the cobra, and resembles it in

general configuration. The adult is some shade of olive green or brown; the shields of the head, the scales of the neck, hinder part of the body and tail are edged with black; the body and hood are marked with black oblique bands. There are several varieties with modifications of colouration, but the general characters are essentially the same. The young differ considerably from the old, and might be mistaken for another genus; they are black, with numerous white, equidistant, narrow cross bands. The shields surrounding the occipital are large, and give a distinctive character to the adult snake. This snake, though widely distributed throughout India and in the Andaman Islands, is not common and probably does not destroy many human lives; but it is very deadly, and its virus seems to have similar effects to that of the cobra. It is found in the forest and grass jungle, and is said to live in hollow trees, and to climb them, being frequently found resting in the branches; it also takes to the water very readily. As its name implies it feeds on snakes, though probably when they are not forthcoming, it is contented with other small creatures. Its hood is smaller than the cobra's; it is even more graceful in its movements and turns more rapidly. The snake-charmers, who prize it highly, say it is very difficult to catch and handle. A fine specimen of the ophiophagus, about nine or ten feet in length, lived for some ten years in the Zoological Society's gardens, and died two or three years ago; it consumed numbers of the common English snake, and, I believe, would eat nothing else. It seemed a quiet, unaggressive creature until roused, when it would raise its head, dilate its hood, and strike at any object brought near it.

Bungarus has two Indian species. The *Bungarus cæruleus* or krait, is probably next to the cobra, the most destructive snake to human life. The other species, *B. fasciatus*, sankni, or raj-samp, is probably equally poisonous; but it is not much brought in contact with men, and therefore is less destructive to human life than *cæruleus*. The krait is of a dark, almost steel-blue black to a chocolate brown, with narrow white cross-streaks, rings, or bars of white; the ventral surface is of a dark, livid colour, or white or yellow tinge; but there are varieties in the form of colouration. This species is common all over India. The fangs are smaller than those of the cobra, and the poison is not so rapid in its action, but it is very dangerous and destructive. It is found in the fields, in grassy plains, rice fields, low, scrubby jungle, and among

débris of wood and buildings. It insinuates itself into houses, into the bath-rooms, verandahs, on the ledges of doors, in book-cases and cupboards: in such situations it not infrequently causes fatal accidents. *Lycodon aulicus* is sometimes mistaken for it, but the least examination detects the difference. The scales along the dorsal region are hexagonal and very characteristic. The krait rarely attains the length of four feet.

Bungarus fasciatus, is larger than *cæruleus*, and is beautifully marked with rings of yellow on a dark steel-blue ground. The metallic lustre of the skin is very beautiful; its body is of a triangular shape, and it has hexagonal scales along the dorsal ridge. It is tolerably common in Bengal, Burmah, and Southern India, and is known in the north-west. It is found in the open country, in grass, in low jungle, and in the fields in holes in the ground, sometimes deep down among the roots of trees; it sometimes finds its way into a native hut. It feeds, like the krait, on small animals, mice, birds, frogs, lizards, probably on small snakes, and even insects. It is not very aggressive, but when attacked, retaliates fiercely. It lies coiled up, and when disturbed, jerks itself out like a spring, but does not extend its whole length of body.

Xenurelaps has only one species, which is closely allied to *Bungarus*. It is very rare, and consequently not destructive to human life.

The genus *Callophis* has several species in different parts of India, which are all more or less brilliantly coloured. They are not aggressive, and bite reluctantly, so it is sufficient to enumerate some of the species: *Callophis intestinalis, C. Macclellandi, C. anularis, C. trimaculatus, C. nigrescens, C. cerasinus*, and probably others.

The viperiform sub-order has two families, *Viperidæ*, or vipers, and *Crotalidae*, or pit-vipers. The former is represented in India by two genera, *Daboia* and *Echis*, each of which has one Indian species, viz., *Daboia Russellii* and *Echis carinata* or kuppur. *Crotalidae* has several genera; *Trimeresurus*, with seven species; *Peltopelor*, one species; *Halys*, two species; *Hypnale*, one species. These snakes are all venomous, but cause few deaths.

The *Daboia Russellii*, sometimes called cobra-monil and chain viper, is a very beautiful snake; it is of a light chocolate colour, with large, black, white-edged rings; a yellow line is on each side of the upper surface of the head, converging on the snout; rostral and labial shields yellow,

with brown margin, a triangular, brown, black-edged spot behind the eye; ventral surface yellowish, or marbled with more or less numerous semi-eireular brown spots, on the hinder margin of the ventral shields. It attains a considerable length, forty to fifty inches. It is eommon in Bengal, the south of India, Ceylon and Burmah, and probably may be found all over the plains and on the hills, up to 6,000 feet, in Cashmir, but its usual habitat is lower.

Fowls bitten by it sometimes die in less than a minute. It is noeturnal, is sluggish, and does not readily strike unless irritated, when it bites with great fury; it hisses fiercely and strikes with great vigour. Its long movable fangs are very prominent objects, and with them it is capable of inflieting deep, as well as poisoned wounds. It does not appear to eause many human deaths, but its misdeeds may be sometimes aseribed to the eobra. The daboia is said to kill eattle when grazing, by biting them about the nose or mouth. In proof of its sluggish nature, there is a well authenticated story of a young person having pieked one up, and mistaking it for an innoeent snake, carried it home. Its true nature was discovered when it bit a dog. It had not attempted to injure the person who carried it.

There is only one Indian speeies of *Echis*. *Echis carinata* (kuppur, afae). This snake is much smaller than the daboia, but grows to the length of 20 inehes or more; it is terrestrial. It is found in the North-West Provinees, Punjab, Central Provinees, Seinde, and generally in the south of India, in the Anamally Hills, in the Carnatie, and in the vicinity of Madras. It is of a brownish-grey colour, with a series of quadrangular or sub-ovate whitish spots, edged with dark brown; a semi-circular band on eaeh side of the dorsal spots enelosing a round, dark-brown, lateral spot; a pair of oblong, brown, blaek-edged spots on the centre of the head, converging anteriorly; a brownish spot below and a broad streak behind the eye; ventral surface, whitish, with brown speeks. The scales are keeled; those on the lateral series have their tips direeted downwards obliquely; the friction of these against eaeh other eauses a peeuliar rustling sound.

The *Echis* is a very fieree viper; it throws itself into an attitude of defenee and offence, coiled up like a spring, rustling its carinated seales as it moves one fold of the body against another. It does not wait to be attaeked before darting its head and body at its enemy, the mouth wide open, and the long fangs vibrating, presenting a most menaeing

appearance. It is very poisonous; the virus is of the same character as that of daboia. There can be little doubt that it destroys many human lives, as men are much more exposed to contact with it than with the daboia. It is said to live largely on the *scolopendridae*, but probably it preys also on small mammals, frogs, and small birds. In some parts of India it is probably chargeable with a considerable number of deaths.

Pit vipers (*Crotalidae*) have several genera in India. They are less dangerous than their American congeners, but are all poisonous. They are remarkable for the pit or depression between the eye and nostril in the loreal region, the triangular broad head, and short, thick body.

Hypnale is the only Indian genus or species with any vestige of the caudal appendage, which has given the name of rattlesnake to certain American *Crotalidae*, and in this species it is reduced to a horny spine at the end of the tail.

Many of the Indian *Crotalidae* are arboreal snakes, and in colour resemble the foliage and branches of the trees in which they live. The Indian genera are:—*Trimeresurus; T. gramineus, T. erythrurus, T. carinatus, T. anamallensis, T. monticola, T. strigatus, T. macrosquamatus; Peltopelor; P. macrolepis; Halys, H. himalayanus, H. Elliottii; Hypnale, H. Nepa* (or carawilla). The bites of most of these do not seem to differ much in their effects from those of the English adder, except the *Hypnale nepa*, or carawilla of South India, which is more dangerous.

There remains only to notice briefly the pelagic colubrine snakes, or *Hydrophidae*. They may be recognised at once by their peculiarities. With one or two exceptions they are all venomous, and inhabit the sea, the salt-water estuaries, and the tidal streams. They have a very wide range of distribution in the Indian and Pacific Oceans. They have a great variety of form, but the transitions are very gradual; some attain a considerable length; I have not seen one of more than five feet, but no doubt they often exceed this. They are very poisonous, and though accidents are rare, yet fatal cases are on record. The fishermen and sailors on the coasts know their dangerous properties, and avoid them.

The *Hydrophidae* have smaller heads, jaws and fangs than the land snakes; the fangs have open grooves in some, but not all. The virus is very active, and appears to operate as speedily and certainly as that of the land snakes. They have an elongated body like the latter; in some instances it is

short and thick; in others it is very thick towards the tail, and most disproportionately elongated and attenuated in the neck, whilst the head is very minute. The colouration is varied, often brilliant and beautiful. The hinder part of the body and tail is flattened and compressed vertically, almost like the fin or tail of a fish, and they swim with ease and rapidity. When thrown on the land by the surf, as they frequently are, they are helpless. Their food is fish and small aquatic creatures. There are certain parts of the Bay of Bengal where they may be seen in great numbers, and their movements in the blue water are agile and beautiful. There are four genera in the Indian seas; *Platurus*, *Enhydrina*, *Pelamis*, *Hydrophis*. *Platurus* has two species, *P. scutatus* and *P. Fischeri* (Bay of Bengal, tidal streams near Calcutta). This genus has several characters of the land snakes, *e.g.*, well-marked ventral shields; body sub-cylindrical, and not compressed like *Hydrophis;* the colour is black, tinged with yellow.

Enhydrina has only one species, *Enhydrina bengalensis* (valakadyen); it is very poisonous; body and tail compressed, belly carinate; colour, bluish-grey, with dark bands of same, though deeper colour; no ventral shields. *Pelamis* has only one species, *P. bicolor*. This is one of the most remarkable sea-snakes in the Bay of Bengal; no ventral shields, body flattened, yellow sides and belly, back black; it is called kullundur, and is very poisonous.

Of *Hydrophis* the species are numerous; in the Indian seas about thirty have been described, and there are probably others. They present a considerable variety of form and colouration; some have elongated necks and small heads, the posterior part of the body being larger than the anterior: others have not this characteristic, but they all have a strong family likeness, and may be recognised at once by their compressed bodies, fin-like tails, and the general absence of well marked ventral scutæ. Their colouring is also remarkable, green, yellow, black, in bands or rings being a common pattern. They are pelagic, though they enter the tidal rivers; they seldom live long in captivity.

The mortality from snake-bite in India is very great. The average loss of life during the eight years ending 1887 has been 19,880 human beings, and 2,100 head of cattle yearly. Mr. V. Richards said the cobra causes nine-tenths of the human deaths. The snakes which are most destructive to life are so probably in the following order:—the cobra,

Naga tripudians; the krait, *Bungarus cæruleus;* the kupper. *Echis carinata*; Russell's viper, *Daboia Russellii;* the hamadryas, *Ophiophagus elaps;* the raj-samp, *Bungarus fasciatus.*

DEATHS FROM SNAKE-BITE IN INDIA IN 1889 AND 1890.

In Madras in 1889, 1,587 human beings, and 2,037 cattle were killed; 340 snakes were destroyed at a cost of Rs. 49. In 1890, 1,424 human beings, and 1,852 cattle were killed; no snakes were destroyed.

In Bombay in 1889, 1,080 human beings, and 74 cattle were killed; 433,795 snakes were destroyed at a cost of Rs. 7,848. In 1890, 1,075 human beings, and 100 cattle were killed; 406,092 snakes were destroyed at a cost of Rs. 7,136.

In Bengal in 1889, 10,681 human beings, and 480 cattle were killed; 41,189 snakes were destroyed at a cost of Rs. 3,439. In 1890, 10,534 human beings, and 538 cattle were killed; 41,115 snakes were destroyed at a cost of Rs. 3,742,

In the North-West Provinces and Oudh, in 1889, 6,445 human beings, and 221 cattle were killed; 25,663 snakes were destroyed at a cost of Rs. 3,137. In 1890, 5,798 human beings, and 247 cattle were killed; 24,083 snakes were destroyed at a cost of Rs. 2,902.

In the Punjab, in 1889, 915 human beings, and 87 cattle were killed; 68,501 snakes were destroyed at a cost of Rs. 8,232. In 1890, 834 human beings, and 32 cattle were killed; 29,941 snakes were destroyed at a cost of Rs. 4,313.

In the Central Provinces in 1889, 1,063 human beings, and 14 cattle were killed; 1,395 snakes were destroyed at a cost of Rs. 558. In 1890, 1,041 human beings, and 54 cattle were killed; 1,554 snakes were destroyed at a cost of Rs. 565.

In Lower Burma in 1889, 208 human beings, and 689 cattle were killed; 6,178 snakes were destroyed, but no rewards given. In 1890, 223 human beings, and 731 cattle were killed; 6,319 snakes were destroyed, but no rewards given.

In Assam, in 1889, 230 human beings, and 71 cattle were killed; 395 snakes were destroyed at a cost of Rs. 23. In 1890, 214 human beings, and 257 cattle were killed; 478 snakes were destroyed at a cost of Rs. 14.

In Coorg in 1889, 1 person was killed; 14 snakes were

destroyed at a cost of Rs. 3. In 1890, 2 cattle were killed; 26 snakes were destroyed at a cost of Rs. 6.

In the Hyderabad Assigned Districts in 1889, 216 human beings, and 120 cattle were killed; 76 snakes were destroyed at a cost of Rs. 26. In 1890, 191 human beings, and 132 cattle were killed; 113 snakes were destroyed at a cost of Rs. 29.

In Ajmere and Merwara in 1889, 53 human beings were killed; 224 snakes were destroyed at a cost of Rs. 10. In 1890, 78 human beings and 3 cattle were killed; 192 snakes were destroyed at a cost of Rs. 20.

In Bangalore, in 1889, 1 human being was killed; 645 snakes were destroyed at a cost of Rs. 231. In 1890, no human beings nor cattle were killed; 746 snakes were destroyed at a cost of Rs. 277.

Throughout India, in 1889 there were 22,480 human beings and 3,793 cattle killed by snakes, while 578,415 snakes were destroyed at a cost of Rs. 23,556. In 1890, there were 21,412 human beings and 3,948 cattle killed; while 510,659 snakes were destroyed at a cost of Rs. 19,004.

"The average result for all the Provinces, shows a mortality of one to every 10,155 of population in 1890, as compared with one to every 9,673 in 1889. The Provinces which showed the greatest loss of life from snake-bite in proportion of population (excluding Ajmere and Merwara) are Bengal (1 to 6,731), the North-West Provinces and Oudh (1 to 8,094), and the Central Provinces (1 to 10,350). The lowest mortality (about 1 to 25,000 of population) occurred in Madras, the Punjab, and Assam."—*Report of Indian Government*, 1891.

As regards the measures to be adopted for reducing the annual loss of life by snake-bite, the chief points are to make known the appearance and habits of the poisonous snakes, and to institute proper rewards for their destruction. With a plain description, and a faithful representation in colour of each species, such as the Government of India have been put in possession of, the people can easily be made acquainted with the characters that distinguish the venomous from the harmless snakes, and thus learn to avoid or to destroy them.

Until some measures are more uniformly resorted to, there will be no material diminution in the loss of human life from snake-bite, which cannot now be rated at less than 20,000 annually.

It is satisfactory to find that the Government of India are insisting upon the institution of measures having for their object the destruction of snakes. It is, however, to be feared that the last measure proposed, *i.e.*, the cutting down and clearing away of jungle in the vicinity of villages, can hardly be expected to have the desired effect, for the reason that the poisonous snakes do not frequent the sort of jungles that surround villages so much as they do other localities, such as ruins, holes in walls and in the ground, grass and cultivated fields, &c., and that also the probability is that a great proportion of bites are inflicted far from the villages, where such clearances as those proposed by Government could not be effected, even were they useful. I would suggest that a reward should be given for each poisonous snake and for no other; there can be no difficulty in identifying them. This could only be effected by an organised system carried out generally in every district in which poisonous snakes exist. If it were decided to try this plan as universally as it is proposed to cut down the jungle, it is probable that a diminution of the evil might be expected; but whatever efforts are made they should be universally sustained and continuous. It is quite admitted that the problem is a difficult one to solve, but no effort should be spared to mitigate what must be regarded as a preventible cause of death.

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Brief Address, delivered on the occasion of the Tercentenary of Galileo, celebrated at Padua in 1892, *by* Sir J. Fayrer, *representing the College of Physicians of London and the University of Edinburgh.*

All' Università di Padova ed ai Delegati.
Centenaio di Galileo.

Illustrissimi e Dotissimi Signori.

Profondamente commosso all'onore accordatomi dal Reale Collegio dei Medici di Londra, ed anche dall Università di Edinburgo, nel nominarmi il loro delegato, io mi presento davanti a questa insegne adunanza, per far onore alla memoria di uno dei più grandi uomini e dei più illustri sapienti del mondo, e per render omaggio da parte del detto Collegio, così bene come dell' illustre centro di scienza e di filosofia in Scozia, all' inclito scienzato, nonche a felicitare di cuore colla massima riverenza, questo antico seggio di scienza e di filosofia in così lieta e fausta occasione, nella quale si commemorano le scoperte gloriose del celebre e rinomato filosofo, col nome del quale è intimamente collegata la sua storia passata ed anche la sua rinomanza attuale.

La scienza di tutto il mondo è senza dubbio in questo luogo ora rappresentata. Da ogni parte sono venuti messaggi di simpatia, ma da nessuno forse, con maggiore premura e zelo che dai compatrioti di Harvey e Newton. Questi, impugnando la facciola caduta dalla mano morta di Galileo, la innalzò e la sostenne per illuminare le tenebre e rischiarare di vera luce i luoghi finallora oscuri anche al gran filosofo stesso; l'altro avendo terminato i suoi studii ed essendo laureato in questa università, divenne dipoi, come socio del Collegio di Londra, famoso per le sue scoperte sulla circolazione del sangue. I suoi studii anatomici che fece a Padova svilupparono in lui quel genio al quale il mondo intero è debitore.

Signori miei, non è solo allo scopritore del termometro, e, come si può dire, all' inventore del telescopio; non è neppure all' astronomo famoso che ha stabilito il sistema eliocentrico, ed ha quasi anticipato le scoperte di Kepler, e che ha dimostrato i satelliti di Giove, le fasi del pianeta Venere, i movimenti diurni e mensili della luna e le macchie solari; non è infine all' autore del "Saggiatore," del "Sidereus Nuncius" e del "Dialogo dei due Massimi sistemi del Mondo,"—ma è piuttosto al fondatore e fautore della filosofia sperimentale che noi rendiamo adesso omaggio ed onore.

Egli, osando pensare ed investigare da se stesso, rigettando gli assiomi degli antichi sistemi di filosofia, anche quello di Aristotile stesso, e rifiutando gl' insegnamenti della teologia dogmatica, stabilì il sistema del libero esame, affermando che la scoperta della verità dev' essere il primo motivo, e che s deve cercarla per via di sperimenti e non sull' altrui autorità e che la verità, tanto in respetto alle scienze divine come alle umane, è unica.

Ardisco dire che nessun migliore tributo si può fare al gran maestro adesso commemorato, che questa riconoscenza festiva dopo trecento anni, dell' assiduo e instancabile lavoro che ha non soltanto rovesciato il sistema Tolomaico, ma ha dato un nuovo impulso vitale ad ogni ricerca scientifica e filosofica.

Signori, con queste poche parole ho tentato d'esprimere i sentimenti dell' illustre Collegio e dell' inclita Università, dei quali io sono il modesto interprete, e ho l'onore di sommettere queste indirizze e con esse, i voti più sinceri dei miei colleghi per la prosperità futura di questa venerabile Università, la quale, molto avanti a Galileo, è stata un primo centro della vita intellettuale in Europa, e che anche adesso è famosa per la sua propria eccellenza e pei suoi rapporti col gran savio di cui si può dire, come ha detto Dante di Aristotile:

"*Tutti l'ammiron, tutti onor gli fanno.*"

7 December, 1892. J. FAYRER.

A LECTURE

DELIVERED AT

St. Katharine's Royal Hospital,

TO THE

QUEEN'S JUBILEE NURSES,

At the request of the Council of the Institute,

ON

NURSING IN CHOLERA, AND HOW TO DEAL WITH IT AS FIRST AID,

BY

SIR JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.,

ON

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FIRST AID & NURSING IN CHOLERA.

IN an interesting lecture given recently by the Rev. the President of your Institute, I find the following appropriate words: "I believe the influence for good of this great nursing work "throughout the land to be incalculable. . . . A regenera- "ting influence will follow the steps of the tender-hearted, skil- "ful, sympathising nurse, which will tarry in the house when "she has gone elsewhere on her mission of love and mercy. . . "She will be the pioneer for good in more directions than one. "The sanitary authorities will find that their hands are strength- "ened by the practical dealing of the nurse, who will teach the "poor how to find out what is wrong about the place, and how "to set it right; . . . the ministers of religion will find that "their work is often less difficult because the kindness of the "nurse . . . has somehow or other touched a chord in the "heart which they have long wanted to get at, but could not, "and, if the hearts of Englishmen and Englishwomen will allow "themselves to catch warmth from the gracious act of the So- "vereign, and will endeavour to see how they can best help to "give an impulse to her beneficent intentions, they will find that "their effort is not unrequited, for . . . . there are none "who more value the work, and are more grateful for what is "done for them, than the sick poor themselves."

Such are some of the concluding words of the lecture referred to, and I could hardly find a better introduction to the remarks which I am about to offer you at the President's request, on the

application of your knowledge of nursing to those among whom it is your mission to minister, should the emergency against which it is our duty at least to make preparation, ever arise.

Having spent many years of my life in a part of the world where cholera prevails, and having consequently had some experience of its movements, modes of action, and effects upon the human race, as also of the methods of dealing with it, I am, perhaps, in a position to offer you advice which may be of practical use should we be visited by the epidemic which, having appeared in France, Germany, Holland, and Belgium, now menaces us also, and certainly renders it expedient that preparation should be made in anticipation of its possible arrival here.

To be forewarned is to be forearmed, and there is no more effective way of ensuring peace than being prepared for war.

Whilst, however, all exaggeration or sensational statements should be avoided; whilst any action or public demonstration which may tend to excite expectancy and anxiety in respect of an impending invasion of cholera, is to be deprecated, it is expedient that whatever forethought can do, under the guidance of science and experience, should be done quietly and unostentatiously now, ere yet the enemy has assailed us, that,—should it come—it may not take us by surprise or find us unprepared.

Our mental attitude may then well be as tranquil as the confidence derived from the assurance that all possible precautions have been taken, can make it.

Now, as respects the sanitary arrangements of the country generally, of the seaports, and the influx of foreigners by sea, it is satisfactory to know that nothing is omitted by Goverment and the Sanitary Department of the Local Board, whether by action or by counsel, which can preserve the country from the evil, or mitigate it should it gain a footing in our islands.

There is good reason for believing that the precautions taken in recent years have had the salutary effect of preserving us from cholera, for whilst our neighbours on the continent have suffered grievously, we have been almost entirely exempt; and from this we may derive confidence for the future, for we know that the same vigilant observation of the progress of the epidemic in Europe is maintained, with the intent that no precaution which can guard our country from invasion or render it antagonistic to epidemic activity should be omitted.

This vigilance is by no means confined to London or the seaports. Throughout the United Kingdom there exists a well-organised sanitary service, administered by medical officers of health, all alive to the danger, and prepared with the means of dealing with it; and notwithstanding differences of opinion that may exist as to the etiology of cholera, there is much unanimity as to the measures necessary to control and mitigate it, with a full appreciation of the vital importance of pure air, pure water

and cleanliness, as well as a conviction that immunity from cholera depends on local sanitation rather than on quarantine, cordons or coercion, which are not only useless in themselves, but hurtful, by diverting attention from the only measures which *can* be relied on.

Cholera has been moving and active in our vicinity. We are alive to the danger, and are prepared to deal with it should it come among us.

But it must be remembered that notwithstanding all the efforts of Government and the health officers, there is still much to be done. The powers of these authorities are not plenary; insanitary conditions still exist in places which public authorities cannot reach, and people do not always observe all prophylatic measures. Insanitary dwellings and localities abound; imperfect drainage, impure water, unwholesome food, and insanitary habits and occupations still render people obnoxious to disease.

Now it is in the crowded resorts of the poor that your influence may be exercised for good, and that your knowledge may be brought to bear, by advice and persuasion, to effect results which sanitary coercion would hardly achieve.

It is not my intention to discuss at any length the natural history or theories of causation and diffusion of cholera. To do so would be out of place on this occasion. Nor do I intend to encroach upon that part of the subject which belongs especially to the pathologist and physician—I mean the nature and treatment of the developed disease. It is rather to the part you, as nurses, may have to play in your intimate intercourse with the people in rendering first aid—and it is impossible to overestimate the importance of the influence you may exert in controlling the earliest approaches of cholera—that I would direct my observations.

In no other circumstances—in whatever sphere of social life your work may lie—is the trained nurse likely to be of more value than in this; for as your very *raison d'être* is to minister to the poorer classes, among whom so much is wanting which is possessed by those more blessed with worldly means, it is in that sphere that your services will be most valuable and best appreciated by the sufferers and their friends, as well as by the physician to whom you will be able to render such valuable aid.

Under these circumstances it is most probable that you may be called upon to act promptly and on your own responsibility, especially should the outbreak be severe. Medical men, however active, energetic, and devoted, cannot be everywhere, and sudden emergencies are likely to occur in which your experience and action may be of the utmost importance in the inchoate stages of the disease. But let me impress on you that in all cases—however trifling they may seem—you should never depend on yourself alone if you can obtain the aid of a medical

man. If this, however, be not always immediately available, it will behove you to do your best, exercising the judgment and discretion which your training in the practical work of administering first aid may have given you.

Here let me refer briefly to the subject of nursing in the present day, and I cannot do so without offering my tribute of sincere admiration and respect for a work which, though it has existed since woman first solaced and assisted those suffering from pain and disease, has of late years attained to so remarkable a pitch of perfection, and has become so essential an adjuvant to medical treatment that one marvels how disease was ever satisfactorily dealt with, or the well-being of the sick provided for without it. No social movement of recent days has been more beneficent, in nothing has your sex contributed more to the common weal.

On my return to England some years ago, after long residence in the East, nothing impressed me more favourably than the splendid system of nursing which had come into existence in my absence. I have watched with infinite pleasure and interest its steady onward progress up to the present, and I am glad of this opportunity of addressing you on a subject in which you are so well-fitted to justify the high esteem in which your vocation is held.

In laying down practical rules to be observed either in anticipation of an invasion of epidemic disease, or as touching the measures of first aid ancillary to medical treatment, I am sensible of the great advantage I have in communicating my views to those so well qualified as you are to carry them out.

The project of making preparation in anticipation of an outbreak of cholera is, under present circumstances, a most judicious one, and it is a source of extreme satisfaction to know that a large body of devoted women is ready to undertake the work of nursing.

There is scarcely any emergency in which such service could be more valuable, for in the treatment of cholera much of the prospect of success depends on early measures and on the nursing. It will not only be a boon of inconceivable value to the public, should the calamity overtake us, but it must be a source of extreme satisfaction to the gracious Lady to whom this association of nurses owes its existence, to know that among the many provisions against the possible danger to her subjects, there are so many competent persons ready, willing and able to undertake this important duty. This will also be the case as regards another great nursing association which has made similar provisions under the auspices of one of Her Majesty's royal daughters.

I must now proceed to the special subject which was represented to me in the following plain and practical words:—"The "Council of the Jubilee Institute are making arrangements to

"place the Queen's Nurses in as good a position as possible to "meet any outbreak of cholera that may occur where their work "of nursing the sick poor in their own homes lies. The Council "think that it would be a great advantage to the nurses who are "being trained in the Metropolis or are working near to it, that "they should attend a lecture given by some one who has had "experience in dealing with it, upon matters in which it is ne- "cessary that the nurse should be well instructed."

Further it is said,—"It is important that the nurses should "learn how to judge of cases in the incipient stage, and how best "to deal with them as cases requiring first aid, till the services "of the medical man can be obtained."

To this proposition I had great pleasure in acceding, for I regard it as a most judicious and reasonable one. It in no way implies encroachment on the province of the physician, whilst such services will lessen his labour and tend to save many lives.

The knowledge one would wish to impart to you is needed not only by every nurse, but would be of great advantage to each member of the community, were cholera to come among us.

I shall presently say a few words on the general characters and symptoms of cholera, sufficient to enable you, as nurses, to detect the earlier manifestations in which you can render the first aid, which may do so much good, and I shall also describe the influence exerted by hygienic measures, sufficiently to enable you not only to detect and arrest the early indications of the disease, but to point out and urge the removal of insanitary conditions which are a source of danger.

This will support you in your efforts to encourage those among whom you labour in realizing how much depends on their own exertions in repelling the assaults of the disease, and in assuring those on whom it may devolve to watch and attend on the stricken, that the danger to themselves is small, for however cholera be communicated, it is not by contagion, in the sense that that term is applied to some other diseases.

I can safely assure you that in all my experience of cholera, I have seen nothing to support the belief that the attendants on cholera patients are more liable to suffer than other members of the community.

The records kept in the military and jail hospitals throughout India show that only 1·9 per cent. of the attendants were attacked—probably a smaller per-centage than that among the community generally. Similar results, I believe, were shown by the statistics of London hospitals for 1866; whilst in the great hospitals of Calcutta, where cholera cases are admitted indiscriminately with others, the disease has never spread.

Such, indeed, has been the experience of India generally, and that too, before the antiseptic precautions and purifications now recommended were insisted on or practised.

The subject of cholera is always one of great interest, but it is especially so now that the mysterious pestilence is again casting its dark shadow over Europe, and threatening our islands.

During the recent epidemics on the continent, we have escaped, or nearly so; but who shall say that this immunity will continue? The means already adopted by the state are about as good as they can be, but it is impossible to say that the conditions which foster the diffusion of cholera are altogether extinct. It would be wrong therefore to neglect the warning by omitting to take precautions.

Cholera exhibits characteristics in common with other pestilences—for example, the plagues of the middle ages. It traverses the earth in all directions, spreading in tropical, temperate, and even northern regions; is often capricious in its incidence, and terrible from the rapidity and intensity with which it strikes, as well as from its obstinate resistance to treatment. Yet it is obedient to certain laws which regulate its origin, diffusion and decline.

Of the true nature of its cause, I fear we must still be regarded as, to a great extent, ignorant; but experience and observation have thrown so much light on its habits and modes of action, as to enable us to mitigate, if not avert, its evil effects. Nor need we be without hope that in time to come, it may have become—like the sweating sickness, black death, and other pests—a thing of the past.

That time, however, has not yet come, and we find it illustrating all the peculiarities of an epidemic, diffused far and wide over extensive countries, leaping—as it were—from one to another by bounds, or spreading rapidly among more limited communities, following a definite track, modified by climatic, meteorological, or local conditions, dying out gradually or rapidly, remaining in abeyance till revivified by new influences, or occurring sporadically or endemically in certain regions, where, as in Bengal, it is never altogether absent, and whence it may at any time appear to spread as an epidemic to countries beyond.

Parkes says—"We have no certain clue to the origin of cho-"lera, and in some respects the propagation of the disease is "very enigmatical. The way, for example, in which the disease "has spread over vast regions, and has then entirely disap-"peared, and the mode in which it seems to develop and de-"cline in a locality in a sort of regular order and at certain "seasons, are facts which we can (as yet) only imperfectly "explain."*

Among the many apparent caprices of this disease, it seems to have an affinity for certain districts—even streets and houses. The same house has been known to be twice the site of the first

*Parke's "Manual of Practical Hygiene."—De Chaumont.

outbreak of an epidemic. There were such houses in Calcutta when I was there. It is worthy of notice also that certain trades, such as the tanner's, seem to confer a prophylactic influence; but everything points to locality as the most important factor in the development of the disease, and to its being the most serious subject for consideration in dealing with an outbreak.

During epidemic prevalence cholera never attacks all the places in the area over which it is diffused, but breaks out in but few of the inhabited towns and villages, sometimes leaping over places in the direct line of its course, and returning to them later during the same epidemic. It is a remarkable fact also, that in Bengal an epidemic moves, not necessarily along the great lines of traffic or with the rivers, but rather against them. Places attacked at the same time are often widely distant, and this is constantly observed in Indian epidemics, only a comparatively small proportion of villages and towns being attacked in any large area where an epidemic, however intense, prevails.

Much of the earth's surface has felt its malign influence, but there *are* geographical regions where it has not yet appeared. It has visited our own islands on several occasions—the last severe outbreak being in 1866—when it caused great mortality. But we were not then so well prepared to contend with it as we are now, and it found a more congenial nidus in which to effect its ravages.

It is far different at present, and we may await its appearance, should it come, with much confidence that measures dictated by sanitary science and experience will render it comparatively harmless.

If we have learnt anything by experience of late years, it is that the invasion and diffusion of cholera are to be prevented or mitigated by careful application of the principles and rules of hygiene;—on the other hand, experience in Europe during the recent epidemic shows how futile coercive measures have been, while the examples of Marseilles, Toulon, Valencia, Palermo, Naples and Hamburg, whose notoriously insanitary conditions have paid their natural penalty, should be a salutary warning as to how cholera may be intensified by local causes, and give a lesson which should not be disregarded.

As I have already told you, the broader sanitary questions are carefully dealt with by Government and our officers of health, but you, who know by your experience in the houses of the lower classes how much there is still to be done towards improving the sanitary conditions of their dwellings and localities, will understand how much good you may do in your intercourse with them to amend what is defective and gradually accustom them to realize that the laws of healthy living cannot be broken or neglected with impunity, especially during the prevalence of epidemic disease.

Cholera, though happily rare in this country, is no new disease. It has been known since the days of Hippocrates: its familiar name in India up to this day is "haiza," the Arabic term by which it was known to Rhazes and Avicenna in the 10th and 11th centuries.

Were this a fitting occasion, I might tell you the story of its wanderings and its ravages in past years, but I must restrict myself to practical points in its natural history and modes of procedure which are germane to the aspects in which you are especially interested.

For similar reasons I must omit disputed questions of causation and modes of transmission and diffusion: for our action must be based on experience and not on theories. I consider it sufficient to quote a paragraph from a paper on cholera written five years ago, which seems as applicable now as it was then.

"The belief in transmission by human intercourse is still firmly "held by the highest authorities; few consider that there is dan-"ger from mere contact or personal communication, but that "the danger lies in the transmission of a germ through water or "other channel from the bowel of one person to that of another. "Hence they insist on what all recognize—the importance of "the purity of the drinking water, because any organic impurity "during cholera prevalence tends to give rise to the pathological "conditions which result in the disease.

"For my part, I am unable to accept the water theory as the "sole and sufficient explanation of all cholera outbreaks, especi-"ally those which occur where the water is beyond suspicion "of cholera contamination."

It would be difficult to overestimate the importance of recent researches into micro-organisms in connection with cholera, but their true relation to the disease has not yet been fully established.

"I rather seek the solution in causes of a more general nature, "but I would speak as one who awaits further information, and "who, though impressed with the belief in the non-communica-"bility of cholera by the ordinary mode of contagion, is not pre-"pared dogmatically to assert that under certain conditions it "may not become communicable, in localities such as quarantine "lazarettes, or other insanitary and crowded quarters.

"I hold, moreover, that until contagion is disproved, autho-"rities are justified in adopting measures which avoid undue "interference with personal liberty, yet take reasonable precau-"tions against possible sources of infection, and give effect to all "known practical measures against the propagation and diffusion "of disease."

Some simple and practical measures you may be called on to put in force at any time in the early stage of the disease, and whatever views on the etiology of cholera may be held by those to whom you are responsible, you will have the satisfaction of

knowing that you are doing that which experience has proved to be the best.

It is the case that British and Indian authorities, basing their measures for protection on ascertained facts, and not on theories of causation or on coercive measures, have come to rely on inspection and sanitation as the real and sufficient means of safety. It is satisfactory to know that this view is becoming more generally accepted by other nations, and that the tendency to combat the inroads and diffusion of disease by sanitary measures alone is becoming general.

The panic produced by the dread of contagion was well exemplified by the state of the South of Europe, which, during the cholera of 1887 was pitiable, and the measures of fumigation, isolation, and general interference with personal liberty which would have been ridiculous had they not been so pernicious. The same feeling still prevails in other parts of the world, and I quote an example (from the *Times* of January 22, 1886) "Two "Japanese sailors died from cholera during the short journey "from Kobe to Nagasaki. Their dead bodies were thrown over-"board. The Japanese authorities immediately forbade fishing "along the coast."—*Sanitary Review.* It would not be difficult to adduce others almost equally absurd.

Up to the present date the belief is maintained by foreign powers that epidemic diseases, and especially cholera, can be arrested in their progress and debarred from entering a country by quarantine. This, as you are probably aware, originally meant seclusion and isolation for a period of forty days, of persons either affected by a disease or coming from a locality where it prevailed. Quarantine is based on the assumption that the disease is communicable from person to person, either by means of the individual himself or of his effects. This view, however, has been modified considerably in its application of late years, and the period of isolation has been much diminished, even by those who, holding the doctrine of contagion, should therefore logically concede the theoretical efficacy of quarantine, but say with De Chaumont:—

"Whatever may be the final opinion respecting the portability "of the disease, we are bound to act as if it was perfectly ascer-"tained. It is usually impossible to have rigid quarantine, for "nothing short of absolute non-communication would be useful, "and this is impossible, except in exceptional cases. . . . . "Then as the incubative stage can certainly last for ten or twelve "days, and there are cases on record where it has lasted for "more than twenty, it is clear that quarantine, unless enforced "for at least the last period of time, may be useless. The con-"stant evasions, also, of the most strict cordon, renders such "plans always useless." *

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*Parkes' "Manual of Practical Hygiene."—De Chaumont.

With reference to the period of incubation, it has been stated to be from a few hours up to twenty days.

The approach of an epidemic of cholera has not unfrequently been heralded by some peculiarly depressed or altered condition of the general health, or even by some other epidemic, such as the influenza, which has lately prevailed in this country.

Outbreaks of cholera, though they generally commence by dropping cases, are sometimes very sudden and violent. A province or a body of men may be struck, the whole community being affected. The outbreak starts from a definite time, and the greatest mortality is compressed into a few days, generally at the very beginning.

Let me give a few examples:—

"While proceeding up the China Sea in one of the late East "India Company's ships we were" says the writer, "suddenly "attacked by cholera, men falling on deck as if struck by "lightning. This continued for three days, when the visitation "as suddenly ceased. As we were then drinking the same water "that we had been using for three months previously, and from "the time of leaving England, there could have been no con- "tamination of the water in this instance; independently of the "fact that it was contained in tanks into which extraneous mat- "ter could not possibly have entered. A precisely similar out- "break occurred on board H.M.S. 'Undaunted,' while proceed- "ing down the China Sea. As the cases continued to increase, "the surgeon, at the end of three days, recommended the captain "to change the course of the vessel. This was no sooner done "than the attack ceased. Not a case occurred afterwards."*

"In 1854, in London, in the district of the Savoy, there were "in a few days 537 deaths from cholera; the suddenness of the "outbreak was very remarkable. The greatest local diffusion "seems to have been reached on the second day, if not on the "first. During two days it prevailed with the greatest intensity, "and in the two following days it showed a diminution of 50 "per cent." †

The suddenness of an outbreak may be followed by an equally rapid decline, and the remarkable alternations, whether for better or worse, caused by changes of weather, fall of rain, depression of temperature, thunderstorms and gales of wind, are very suggestive of the influence exerted by meteorology on its progress. Sudden outbreak followed by rapid decline was well illustrated when cholera attacked our troops and ships in the Crimea.

After its arrival in the Levant, the French army had suffered a great deal from sickness, but the British army had been comparatively free up to the 19th of July, when cholera appeared

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* Parkin, "Are Epidemics contagious?"

† "Journal d'Hygiene," Nov. 3rd and 17th, 1887.

among our regiments in Bulgaria, and by August 19th had killed 532 men. Before appearing in our army it had attacked French ships of war in the Mediterranean and their army in Bulgaria, making great ravages among the three divisions marching into the Dobrudja and in the ships. In a day's march, sometimes within the space of a few hours, hundreds of men dropped down in the sudden agonies of cholera. Out of these three divisions no less than 10,000 lay dead or struck down by sickness.

The disease appeared in the British fleet, and on the 11th and 12th of August the admirals put out from their anchorage, hoping thus to arrest its progress. It nevertheless raged with a violence rare in Europe; the "Britannia" alone lost 105 men, and the number of sick was so great as to render the usual duties impracticable.

"The waywardness of the disease on board the British ships "was extraordinary; it spared the officers, who, partly by kind- "ness and sympathy, partly by remedies, seemed often able to "fight the disease, or make the men think they did so."

"Almost suddenly the cholera ceased on board ship, the sur- "vivors returned to their duties, all mention of the terrible tra- "gedy was dropped, and in a few days from the time when "cholera had been at its height, the crews were ready to embark "the troops and land them in the Crimea."*

The great epidemic which broke out among the troops of the army of Lord Hastings in India began on November the 7th, 1817, was in all parts of the camp on the 9th, and reached its height on the 17th. During the week in which it raged most violently, 764 soldiers and 8000 camp followers died; the epidemic had ceased by the 22nd or 23rd of November.†

An outbreak occurred in May, 1818, among the Nagpore subsidiary force. Between 70 and 80 cases were admitted the first day, and many were found dead and dying about the camp.†

Another instance is the great outbreak at Kurrachee in 1846. On Sunday evening, June 14th, there was a sudden change in the atmosphere, the wind veered from south-west to north-east, and a thick, lurid cloud darkened the air. Later on in the evening cholera appeared in thirteen corps of the troops stationed there; it increased in violence till the 16th, when 227 cases were admitted, of which 186 died; after that date it gradually declined, 814 cases and 442 deaths having occurred between the 15th and 18th (inclusive).†

Without any premonitary symptoms, cholera appeared at Peshawur, at five o'clock in the morning of May 17th, 1867; from that day till the 23rd, the number of cases increased daily, and after that date decreased gradually, the last case being admitted to hospital on the 31st.†

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*Kinglake "Invasion of the Crimea." Vol. viii.

†Quoted from Bryden. Cholera in the Bengal Presidency from 1817 to 1872.

A remarkably sudden outbreak occurred in an orphanage at Secundra, near Agra, on May 29th, 1867. The girls were caught in a sudden shower of rain, the elder ones being the most exposed to it. One of them was found dying at four o'clock the next morning, and subsequently 40 of them and 6 of the younger girls were attacked. On May 30th, 16 cases were admitted; on the 31st, 15; between the 1st and 6th of June, 15; the disease then died out.

In an establishment for pauper children at Tooting, in 1849, there were crowded 1395 children, little more than 100 cubic feet breathing space being allowed for each child. One night cholera attacked 64 of these children; 300 were attacked in all, and within a week 180 died.*

The epidemic of 1832, in Paris, commenced on the 26th of March, and increased so rapidly, that in eighteen days it had reached its climax, and had already extended to all the quarters of the city, and had been fatal to 7000 people.†

It would be easy to adduce other examples, but these are sufficient to illustrate the point.

Let me now say a few words on the disease itself.

The premonitary symptoms of cholera are malaise and diarrhœa, generally painless and often not violent at the outset. This may continue in some cases for days before it assumes the specific character of the disease, that of profuse watery discharges from stomach and bowels.

There is good reason to believe that if diarrhœa be checked early by simple measures, cholera may often be averted. For this reason the slightest indication of it should be enquired into and at once arrested. It is at this early stage that you can render that first aid which is of such importance.

It is quite true that cases may occur in which a dose of castor oil might be more appropriate, but as you would hardly be able to discriminate between these, and bearing in mind the importance of immediately checking all diarrhœa in cholera seasons, it is better you should do so, for in the cases in which it might not have been really necessary, no harm will be done that cannot easily be remedied, whilst you *may* have averted an attack of cholera.

The medical men under whom you work will give you the formula they approve of for the purpose, probably an astringent, combined with aromatics and laudanum.

In India it used to be, perhaps still is, the custom to supply the people in cholera seasons with pills consisting of asafœtida, black pepper, and half a grain of opium in each, to be taken on the appearance of diarrhœa.

Should it progress to cholera, the diarrhœa will become fre-

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*Southwood Smith. The Common Nature of Epidemics.

† Baly and Gull. Reports on Epidemic Cholera.

quent and, like rice-water, whilst incessant vomiting of rice-watery looking fluid, cramps, great exhaustion, lividity of skin, and husky voice will soon be followed by collapse, suppression of urine, and too frequently death.

There are certain erroneous notions about cholera; *e.g.*, one is to give that name to the disease only when in its fully developed condition. But the fact is that it presents many phases, varying in gravity from simple malaise to collapse. Sporadic cholera, or "cholera nostras," as it is called when it occurs in this country, is regarded by some as a different disease from Asiatic cholera, or "cholera maligna," but the cholera of our country is indistinguishable at certain stages from that of India.

I believe that the difference in intensity or epidemic prevalence depends on climate, locality, and certain conditions not yet definitely known.

Whilst the disease is in its incipient stages you may frequently have the opportunity of acting on your own responsibility, but in all cases, I repeat, obtain medical aid if possible, and remember that it is not only in the administration of simple remedies at the outset, but in the carrying out of your instructions generally that you will be able to give the most effective aid, whether in the early or later stages of the disease; in the latter especially, your action must be guided by the medical officers.

I will briefly summarise the methods of procedure before I conclude this lecture.

When the symptoms of cholera have established themselves, the patient's condition rapidly becomes one of great gravity. The vomiting and purging are frequent and profuse, the strength rapidly fails; the patient is tortured by cramps and thirst; the temperature is depressed, the voice becomes husky, the countenance and surface livid, the renal secretion is suspended, the skin of the fingers becomes shrunken and corrugated; and if reaction do not take place, death soon closes the scene.

During these stages of the disease, the services of the nurse are of the utmost importance, and her unremitting attention is required in the administration of medicine, nourishment, stimulants, and ice to relieve the intense thirst; the application of sinapisms or other counter-irritants; friction of the limbs and body, and other measures that may tend to alleviate the sufferings, moderate the symptoms, sustain the rapidly failing vital energy, and give intelligent effect to the physician's directions generally.

I cannot here pretend to indicate the remedies or nutriment that should be administered, or the local applications that should be made. In all this you must be guided by the medical officer under whose direction you work; but I can assure you that on your watchful, skilful care and intelligent interpretation and fulfilment of his behests, the life of the patient may depend.

As I have already said, the disease assumes many phases and degrees of intensity, and though very fatal in the most severe forms, happily in those of less intensity recovery often occurs; and let me repeat that in no form of disease does the issue depend on good nursing and intelligent interpretation of the physician's orders more than in cholera.

The mortality is high when cholera has reached the condition of collapse or consecutive fever. At the outset of an epidemic probably half or more than half of those affected die. The fatality decreases as time goes on, and this has sometimes led the inexperienced to think that they have found some more effective treatment than any hitherto known.

The diminution in intensity and fatality as an epidemic progresses is not confined to cholera. It was observed by Defoe in the plague of London during the 17th century. In an outbreak of cholera at Kurrachee, of the first 100 admitted, 79 died; of the second, 66; of the third, 50; of the fourth 40; at a later period the mortality diminished and the cases were less severe.

The following conclusions may be deduced from experience;—

1.—That in cholera epidemics, though the disease is generally heralded by premonitary attacks of diarrhœa, often trivial and painless, yet the cases of fully developed cholera are more frequent and more severe at the commencement than in the continuance of an outbreak.

2.—That hygienic measures afford the greatest security, but still are not an absolute safeguard against cholera. Local insanitary conditions and impure water, especially if contaminated with cholera dejecta, impure atmosphere from overcrowding and from emanations from drains and cesspools, decomposition of organic matter, imperfect ventilation, absence of cleanliness generally, favour its incidence and increase its intensity.

3.—That cordons and quarantine have utterly failed to prevent the spread of cholera, but on the contrary, have done harm.

4.—That it is important to check all diarrhœa in times of cholera prevalence.

5.—That to enter an area in which cholera is present or to travel within that area is dangerous to a new-comer, while residents whose circumstances of living are favourable have a better chance of escape.

6.—To change the locality is the best course to pursue when cholera attacks a body of men, such, for example, as a regiment.

7.—That attendants on the sick do not suffer more than others.

8.—That irritating articles of diet, unripe fruit, tainted animal food, fish, flesh or fowl, and saline aperients are liable, during cholera prevalence, to bring on diarrhœa which may rapidly pass into cholera.

9.—That fatigue, exhaustion, intemperance in alcoholic drinks, fear, anxiety begotten of dread of contagion and sensational

descriptions of the horrors of the disease, and sudden vicissitudes and alternations of temperature are powerful predisposing and exciting causes.

10.—Having suffered from cholera gives no immunity from recurrence of the disease.

The question then arises, what does it behove each individual of the community, and especially what is it incumbent on you, the Queen's Nurses, to do, as regards your household, district, village, town, or the country generally—*i.e.*, as far as your influence extends—when cholera threatens or has actually made its appearance?

In the first place, bear in mind that coercive measures are futile: they divert attention from the true and only source of safety, which lies in the removal of all insanitary conditions which may give fatal activity to the disease.

Use every effort to secure good ventilation, pure air and pure drinking water, well-trapped sinks and good drainage, with the removal of all cesspools, foul dust-bins, ash-pits, decaying vegetable or other organic matter.

Avoid as much as possible damp, ill-ventilated rooms, overcrowding, and every impediment to the free circulation of air.

Careful living—by which I mean regularity and avoidance of all errors in diet, all depressing and exhausting habits or occupations—is essential. Let the food be plain, the water and milk be boiled before drinking, and avoid all excess of alcoholic stimulants, indigestible or imperfectly cooked food, and especially animal food, whether of mammal, bird, fish, crustacean or shellfish, unripe and partially decayed fruit or vegetables.

Professor Notter, of Netley, a high authority on hygiene, points this out in some remarks which are of great practical value.

Be most careful to avoid chills or exposure to sudden alternations of temperature, aperient medicines, especially saline aperients. Wear woollen next the skin: a flannel belt is often worn in India.

Do all you can to secure personal cleanliness of body and clothing. Avoid fatigue or exhaustion.

Be careful that all excreta are freely disinfected and removed; the drain or sink into which they are thrown should be well flushed with carbolic acid water. Use disinfectants freely for clothing, rooms, and houses.

Whenever you detect any breach of these directions, do your best by persuasion and advice, or by the intervention of sanitary executive authority, to rectify them.

Endeavour to keep a good heart and a cool head; be hopeful and cheerful yourselves, and encourage that feeling in others, for panic, fear and anxiety are very apt to favour, if not to provoke, the onset of the disease.

Do not be afraid to attend on the sick, and encourage others to the same purpose, for no danger is incurred thereby, whilst, as I have said, a mental attitude of despondency or dread of contagion is full of danger, as has been proved by frequent experience.

I would impress on you that it is on such measures only you may repose confidence, and that, if carefully carried out, experience shows that reliance may be placed on them.

Do not for a moment suppose that I regard cholera merely as a result of dirt and insanitation. It is something more than this, but so much is certain, that to prevent the onset, or control the evil effects of cholera, sanitary measures, strictly carried out, are of all things, most effective.

With reference to the part you, as Queen's Nurses, will be called on to play, I find that excellent recommendations have been already made by your Council. They are to a great extent based on those of the Royal College of Physicians and of the Government Local Board, and I can do little more than endorse and emphasize them.

In the first place I notice that the superintendents of your Nursing Homes are recommended to acquaint themselves without loss of time with whatever special arrangements may have been made by the local or other authorities for giving medical assistance within the district, and to ascertain what steps the nurses are to take with reference to cases of diarrhœa or cholera. That, having obtained this information, each Superintendent should inform the Nurses how to communicate, with the least possible delay, with the proper medical authority for notification of any such case; also the nearest centre for obtaining medical aid, medicine and disinfectants.

It is very important that centres where medicine and medical comforts and disinfectants can be got at any moment, should be well known and accessible.

I would suggest that as, in crowded neighbourhoods especially, there will probably be hospitals for the reception of cases, the Nurse should know where these are, and the best means of effecting removal to them when necessary.

I would further suggest that each Nurse be supplied with some simple remedy to be given at once to any case of diarrhœa of which she may become cognizant.

The Nurses should be made acquainted with the regulations of the Local Government Board, or district sanitary authority, with regard to the disinfection of houses, clothing, furniture, etc., so that they may at once take the requisite steps.

They should be made acquainted with any arrangements for affording relief to the very poor, so that there may be no loss of time in communicating with the relieving officer or other person appointed to dispense such relief in any case of want or destitution

since privation, as a predisposing cause, may require special aid.

If extra local centres could be established in poor, overcrowded neighbourhoods, where the Nurses could procure nourishment and comforts for the sick, it would be an excellent prophylactic measure.

It is further recommended that the Superintendents of all Nurses' Homes should enjoin the following precautions on the Nurses:—

In the first place that they should preserve an equable frame of mind, and endeavour to maintain it in others. They should avoid, as I have said before, excitement or exaggeration; they should not dwell on the dangers of exposure to contagion, and on the terrors of the disease; or, in short, do or say anything that may discourage or depress.

Let me repeat that to do so can cause nothing but harm. Panic, depression, and anxious expectancy are the worst frame of mind in which to meet cholera, whilst the converse has exactly the opposite effect.

As an illustration of this, let me tell you the following Oriental story:—

A Dervish travelling over the desert met the Genius of Cholera, to whom he said, "Where are you going?" The Genius replied, "I am going to Baghdad to kill 20,000 men." Some time afterwards the Dervish met the same Genius returning, and accused him of having killed 90,000. "No, no," said the Genius of Cholera, "I killed only 20,000, fear killed the rest."

The advice I have just given is probably unnecessary for the majority of the highly trained women I have the pleasure of addressing, but as there are timid natures to whom encouragement may be helpful, it is right that they should know that the danger exists chiefly in the imagination, as far as nursing cholera is concerned, and that, as to other sources of danger of incurring the disease, they but share alike with the rest of the community, whilst risk to all is vastly diminished by conforming to the rules of hygiene.

The Superintendents are enjoined to impress on the Nurses that they should not go on duty, if they can avoid it, when feeling fatigued or unwell, especially if affected with any relaxation of the bowels; that it is necessary for them to take a good, plain, nourishing diet—even an extra allowance—and at regular and not too long intervals. The depression caused by fatigue, hunger, and an empty stomach predisposes to the disease. Such food should be available by night as well as by day.

As to stimulants—it is not necessary that they should be taken in increased proportion, though occasions may arise when an extra allowance will be expedient.

It is only too probable that in your ministrations among the poor, especially should cholera appear in crowded neighbour-

hoods, it may not be possible for you to observe to the letter all these directions; but at any rate remember and observe them as nearly as you can. You must, under such circumstances, necessarily be exposed to many hardships and risks, but it is a noble work, worthy of your highest aspirations, and twice blessed, for it will, like mercy, bless those who give as well as those who receive.

The Superintendents are emphatically to caution the Nurses as to any neglect on their own part or on that of others of perfect cleanliness of person and clothing, which should be carefully disinfected. This again, under the circumstances, will often be very difficult, but do your best to ensure it, as far as possible.

You will, no doubt, see much that to your instructed eye is suggestive of danger from insanitary conditions, which, alas, you are unable to prevent. But you may do a good deal, and whatever warning, advice and remonstrance can effect, you should insist on. Do not wait for the actual advent of cholera, but try and accomplish this before it comes.

I have already referred to the need for personal cleanliness, and on this the Nurses should strenuously insist. The houses should also be kept as clean and well-ventilated as possible; dust-bins emptied frequently; no decaying matter or dirt of any kind to be allowed to accumulate in or near the house or premises. No cesspools to be tolerated if it is possible to remove them. All latrines and closets should be kept in good order, and flushed frequently with disinfecting fluids. The best are solutions of corrosive sublimate ½ oz., hydrochloric acid 1 oz., dissolved in three gallons of water and coloured with five grains of aniline blue. This is a disinfectant in the truest sense; the only objection to it is its poisonous nature.

Professor Notter says that a five per cent. solution of carbolic acid is quite effective, and this would be safest for the Nurse to use for general disinfecting purposes, and a good supply of it should be available. He strongly recommends that all dejecta should be disinfected with it or by chloride of lime, whilst all linen or bedding soiled by cholera discharges should be destroyed by burning, or soaked in the corrosive sublimate solution, or heated in a disinfecting chamber.

Fumigation by burning sulphur or chlorine gas is effective in rooms, but these must be used in large quantities to be of any avail.

Much stress—and rightly so—is laid on the purity of drinking water. It should be obtained from as pure a source as possible, and should be well filtered and boiled shortly before using. All tainted wells should be closed. Milk also should be boiled shortly before it is used.

Provisions of all kinds should be as fresh as possible. As I have before said, all stale food, especially flesh or fish, should be

avoided. Notter attaches much importance to this as regards fish, which unhappily is often sold to the poor in a stale condition.

It is the conviction of most medical men who have had to deal with cholera epidemics that it is right to check diarrhœa at the outset in cholera seasons. Of this I have already spoken.

I again repeat, seek medical advice as early as possible, and it is most desirable that all persons should know where to find it; but in anticipation, the Nurse will do well to administer a dose of some astringent such as the following, whenever diarrhœa appears:

Pulv. aromat.....	three drachms.
Sal volatile	three drachms.
Tr. Catechu	ten drachms.
Tr. Card. Co.....	six drachms.
Tr. Opii	one drachm.
Mist. Cret.	twenty ounces.

Dose.—1oz. for an adult, ½oz. for a child 12 years, ¼oz. for a child 7 years, less for a younger child in proportion to age, after each liquid motion.

Professor Notter says:—"For the diarrhœa which precedes "cholera, and for the early stages, to check it, I found nothing "better than:—

"Acid Sulp. dil.	fifteen minims.
"Tr. Opii	five minims.
"Aq. menth. pip.....	one ounce.

"and this might be safely left with a nursing sister.

"If the comma bacillus is the cause, we know that it will not "live in acid media. So there is good reason for prescribing that "form of astringent.

"For like reason, acid drinks should be given, *ad lib.*, to make "up for the water passed off in the discharge from the bowels, "and to relieve the kidneys, which become early involved.

"I found this the best treatment in the early stages myself. "Of course, after the first two doses, I omitted the opium."

The College of Physicians has formulated some excellent rules for the early treatment of cholera. You will find them in the leaflet of recommendations issued by your Council. Those which apply to first aid I have already mentioned. The others are rather such as would appertain to the medical man, so I need not repeat them here.

I hope I have now told you enough to show you how you should act, and I can hardly sufficiently insist on the importance of the services you may render in relieving suffering, assuaging pain, and giving confidence to the healthy as well as to the sick.

You will have full opportunity of doing all this, and of justifying the encomium passed on your order by your reverend and respected President. You will establish a claim to the gratitude of your countrymen and countrywomen, but far better than this, you will have the satisfaction arising from the consciousness of

duty well and thoroughly performed; the solace of knowing you have rendered valuable aid in a great emergency, relieved suffering, and, it may be, have saved life.

You will have done more too, for you will have contributed your share towards that great end to which sanitary efforts aspire, the diminution, if not the extinction of the pestilence. You will have furthered in some degree, however small it may be, the object to which we all hope to attain, as was well expressed by Dr. Southwood Smith, a sanitarian and epidemiologist, whose loss we continue to deplore, when he said:—

"Epidemics are under our own control; we may promote their "spread, we may prevent it. We may secure ourselves from "them. We have done so. We have banished the most for- "midable. Those that remain are not so difficult to be con- "quered as those that have been vanquished. . . . . We "see that epidemics are not made by a divine law the necessary "condition of a man's existence upon earth. The boon of life is "not marred with this penalty. The great laws of nature, which "are God's ordinances in their regular course and appointed "operations, do form and give off around us, products which are "injurious to us; but He has given us senses to perceive them, "and reason to devise the means of avoiding them, and epidemics "arise and spread because we will not regard the one nor use "the other."

"Let us," says Dr. Dallinger, in a recent address, "do our "duty and act up to our knowledge, and as surely as disease "comes among a people by physical laws broken, so it will de- "part from them if they see to it that physical laws are obeyed."

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Read at the Calcutta Congress, 1894

CARLSBAD

AND

ITS THERMAL WATERS FOR ANGLO-INDIANS.

By Sir J. FAYRER, M.D., F.R.S.

MY OLD FRIEND, Surgeon-Colonel Harvey, President of the Calcutta Congress, having requested me to contribute a paper on the advantages of a visit to Carlsbad by Anglo-Indians who are suffering from the effects of climate and tropical disease, I have much pleasure in complying with his request, knowing from personal experience and observation of the results to many who have gone there on my recommendation that great benefit is often conferred, not only on those who have had to leave India on sick furlough, but on others who have retired from the service and still suffer from the consequences of prolonged sojourn in a hot and malarial climate.

It has always appeared to me that this most valuable of health resorts is neither sufficiently known nor appreciated, and that erroneous impressions as to the depressing and debilitating effects of the waters and diet exist which better knowledge would probably remove.

Carlsbad, like other health resorts, is not suitable to all complaints, but for a large number of chronic functional disorders, to which old Indians especially are liable, it is often of great and enduring value. I

should be glad, if I could induce those to whom I believe it is so well adapted to try it either on their way to England or later ; and I believe that if many who have retired from the services would spend a month or three weeks there every year for two or three years they would probably derive lasting benefit.

Carlsbad, which is easily approached by those returning from India *viâ* Venice or Trieste, is situated in the north-west of Bohemia, not far from the Saxon and Bavarian frontiers. It is in 50° 13′ N. latitude and 12° 53′ E. longitude. The town itself, which is 1,200 feet above the sea, lies in a valley through which the Tepel, a bright trout stream, flows to join the river Eger, their confluence being in close proximity to the town, which is built on the banks of the river and on the hills which rise in terraces on either side in most picturesque forms, one, the Ewigleben, being 800 feet above the town. They are densely wooded with magnificent pine, spruce, beech, birch and other trees. Through these woods innumerable well-kept paths and roads lead to fine points of view of the town and neighbouring hills, the Erzgebirge and other mountains, and of the ranges of forest country which stretch away to the Böhmerwald. The Tepel and the Eger are beautiful streams, with picturesque and in some places rocky banks. In the woods the odour of the pines is often very perceptible ; they afford pleasant shade during the summer and enable visitors to spend much of their time in the open air.

The weather is variable, the temperature at night and the morning being subject to marked changes. The mean temperature of the year is 43° F.; of summer 66·5° F.; but in July and August there are days of great heat as there are in many other places. In the spring and autumn it is 47° F. in the winter 27° F. The prevailing winds are from the west and north, the latter being cool and bracing in summer.

The annual rainfall, according to a return kindly supplied to me be Dr. Schuman Leclercq, a resident physician at Carlsbad, is as follows:—

January	...	1·46 in.	July	...	2·77 in.
February	...	1·99 „	August	..	0·91 „
March	...	1·26 „	September	...	2·05 „
April	...	0·01 „	October	...	1·89 „
May	...	3·89 „	November	...	2·51 „
June	...	1·03 „	December	...	0·78 „
			Total	...	20·55

The source of the mineral springs is in a vast reservoir at a considerable depth below the surface. Great part of the town is built upon the Sprudelstein, a hard calcareous crust deposited by the water.

Carlsbad has always been remarkable for the purity and salubrity of its atmosphere. No contagious epidemic has ever visited the town. In the Austro-German war, when cholera prevailed in the surrounding districts, Carlsbad was exempt.

The population is of a very mixed character, especially in the season which extends from May to September, when it is visited by people from almost all parts of the world. The waters are accessible at all times of the year, but few people resort to them during the winter months, when it is cold and dreary and the ground covered with snow. A considerable number remain till November, but after that there are very few visitors. The resident population is about 12,000, the visitors about 30,000 annually.

The warm springs of Carlsbad, though apparently unknown to the Romans, have long been famous for their medicinal virtues. A legend says they were discovered in the 14th century by the Emperor Charles IV. during a hunting expedition. Whatever may be the truth of this story, there is no doubt that the town owes its name, and probably its existence, to that Sovereign, but it is only within the last century that they

have attained their present widespread reputation. It would appear from the records of the place that at one time they were drunk in inordinate quantities—an abuse which probably laid the foundation of prejudices which still exists, but are gradually disappearing as more judicious use of the waters and the baths has shown their efficacy in the treatment of numerous forms of disease and functional disorder.

The hygienic condition of the town, on the whole, are good, but a more complete system of drainage is on the point of completion, which will leave little to be desired from a sanitary point of view. Engineering difficulties connected with the springs have hitherto impeded the progress of this work, but these appear to have been overcome and the desired object attained. Meanwhile the low death-rate and absence of epidemic disease points to a high state of salubrity.

The Carlsbad springs yield warm alkaline, saline waters. They are clear and sparkling, free from any disagreeable taste or smell and vary in temperature and amount of free carbonic acid, and they all contain the same solid constituents, the proportion varying in only a very slight degree, and all come from one common source emerging at no great distance from each other, the differences in temperature and amount of carbonic, and depending on the depth from which they come and the nature of the channel by which they reach the surface. They all—the Sprudel especially—deposit a yellowish or dark brown crust consisting of calcareous, silicious earth with traces of iron. These are kept in solution by the carbonic acid, which, being parted with on coming to the surface, occasions the deposit which has formed the crust before referred to on which part of the town is built and which colours the ground and rocks wherever surplus Sprudel water flows.

There are numerous springs in Carlsbad. Those chiefly in use are the Sprudel, Muhlbrunn, Schlossbrunn, Marktbrunn and Felsenquelle. Around these

numbers of patients congregate, the others are less in request. To the differences which exist between the springs, such as they are, the experienced physicians of Carlsbad attach considerable importance, as may be seen by the greater attendance at some than at others.

The active constituents in these waters are sulphate and carbonate of soda and chloride of sodium; no doubt the other salts contribute some share in determining their efficacy.

The following table, according to Dr. Kraus, gives the temperature and chemical composition of the springs :—

Names and temperatures of the thermal springs now in use at Carlsbad.

Sprudel	162° F.
Hygieaquelle	162°
Marktbrunn	111°
Kaiser Karlsquelle	119°
Russische Krone	95°
Schlossbrunn	129°
Muhlbrunn	129°
Neubrunn	141°
Theresienbrunn	139°
Bernhardsbrunn	150°
Elisabethquelle	109°
Felsenquelle	140°
Kurhausquelle	149°
Kaiserbrunn	120°
Parkquelle	99°

Many analyses of the Carlsbad waters have been made. They give an average of 41 to 42 grains of solids in each pound of water. The differences in the various analyses are so trifling as not to require notice.

Solid constituents of three principal springs.

	Sprudel.	Muhl.	Schloss.
Sulphate of Potash ...	1·2564	1·7172	1·4645
Sulphate of Soda ...	18·216	17·961	17·2455
Chloride of Sodium ...	7·9156	7·869	7·5282
Carbonate of Soda ...	10·4593	10·868	9·5620
Carbonate of Lime ...	2·2870	2·0236	3·0658
Carbonate of Magnesia ...	0·9532	0·2641	0·3870
Carbonate of Protoxyd. Iron ...	0·0215	0·0230	0·0176
Carbonate of Protoxyd. Mangan.	0·0046	0·0053	0·0053
Carbonate of Strontia ...	0·0061	0·0069	0·0046
Phosphate of Aluminium ...	0 0030	0·0025	0·0023
Phosphate of Lime ...	0·0015	0·0016	0·0030
Fluoride of Potassium ...	0·0276	0·0268	0·0291
Silicious Earth ...	0·5590	0·6190	0·7365
Total of solid constituents ...	41·7090	41·3870	40·1523
Free Carbonic Acid { in grains	5·876	7·3260	10·2940
Free Carbonic Acid { in cub. in.	1·8820	14·8370	20 6260

Traces of lithia, boracic acid, iodide of sodium, bromide of sodium.

One spring called the Eisenquelle differs entirely in its constituents from the others, and is probably from a different source. It contains a small quantity of iron, and is used as a chalybeate. Its temperature is only 48° all the year round. There are one or two others, such as the Saverbrunn, which contain few mineral constituents, but are largely impregnated with carbonic acid gas ; they form pleasant drinking water.

A favourite drinking water, which contains a quantity of carbonic acid, and is much used in cases of uric acid and gout, is brought from the Gieshubler-Puchstein springs, a few miles distant from Carlsbad. All the other springs lie within a radius of half a mile from the centre of the town.

Bathing is an essential part of the treatment for some complaints. The mineral baths consist chiefly of the Sprudel water, the temperature varying from

90° to 100°, to which the pine needle extract is sometimes added. The peat or mud bath is also frequently used; it is a thin, pulpy mass, made of peat which comes from Franzensbad, mixed with Sprudel water, and is used at a temperature of 90° to 104°. Vapour baths and douche baths are also much in use. The iron water baths are supplied by the chalybeate springs before mentioned. Acidulous baths are supplied by the Saverbrunn springs. The peat baths are much in use in gouty and rheumatic swelling and exudations.

The therapeutic value of the Carlsbad waters depends chiefly on the sulphate of soda, which has a gentle purgative action. The carbonate of soda neutralises acid, the chloride of sodium and other constituents combined with carbonic acid, and in conferring on the water its solvent powers and materially contribute to the solution of various exudations and concretions which may be forming or have formed. The general effects are promotion of defæcation and diuresis, absorption of fat and modification of metabolism promoting a favourable influence on the blood formation, improving digestion and nutrition and the integrity of the functions generally.

The waters, which are usually taken early in the morning, sometimes also in the evening, in quantities varying from 2 to 6 tumblers in the 24 hours, according to circumstances, are agreeable to the taste. They produce gentle action of the bowels with flatus strongly tainted with sulphuretted hydrogen. The stools are at first of a dark green or blackish appearance and contain increased secretion of thick bile; the dark colour is partly due to the result of decomposition of the sulphate of soda and consequent formation, with the traces of iron in the water, of sulphide of iron.

After a few days' use of the water, the quantity of urine is considerably increased and the acidity is diminished, but an alkaline reaction, Kraus says, is never induced. Seegen shewed decrease in uric acid and urea with a corresponding increase in phosphoric acid.

The mucous membrane soon shews more vitality, and increased secretion consequently follows. The nervous system is energetically influenced.

The good effects, though often manifested early, are not so always, and the patient may leave Carlsbad apparently no better than when he went there ; but improvement so frequently occurs later as a result of the treatment that it would be unwise to pronounce unfavourably on leaving the place.

It is not necessary in this brief notice to say more on the general action of the waters. It is obvious from the above how peculiarly they are indicated in many functional disorders of tropical residents. Their salutary effects are, of course, greatly enhanced by the circumstances under which they are taken, such being the change of air and surroundings, the perfect rest, open air life, moderate exercise, the well-ordered dietary mental relaxation, the absence of work and worry, the mental attitude of a society whose chief aim and object is to do all that is conducive to restoration of health.

I do not venture to indicate the respective merits of the different springs ; all—as before shewn—contain the same constituents, yet they have different actions, and therefore are respectively applicable to different cases. Their special indication as well as the amount of exercise, the nature of the diet, quantity of stimulant and duration of the stay at Carlsbad, can only be authoritatively laid down by one or other of the able physicians on the spot. The question of bathing, in addition to the internal use of the waters, must equally be determined by local medical authority, and the nature of the baths, whether simple Sprudel water, peat, vapour or douche, will depend on the special symptoms in each case. The same may be said of massage.

I feel convinced that, rightly used, with due attention to diet, habits and mode of living, the Carlsbad waters are capable of conferring great benefit, without the depressing effects so often attributed to them, but the cases for which they are appropriate must be

carefully selected. Organic diseases of all kinds, especially if in an advanced condition, should not as a rule be sent there, though in the earlier stages of some so much improvement in the general health may result as to retard their development and ameliorate the condition of the sufferer. But when the cases which are not appropriate are excluded, a number still remains for which the benefit will be great indeed.

The nature of the ailments for which the waters are applicable has been clearly pointed out by many authorities, whilst the necessity for care in respect of mode of life, diet and occupation, the importance of travelling slowly, the need for repose and sojourn in some bracing locality after the treatment, and delay in return to work and to those causes by which the original trouble was induced, have been equally insisted on, and I can only say that they apply as much to invalids from India as from elsewhere. It remains only briefly to notice the conditions for which Carlsbad is likely to be useful to Anglo-Indians.

The waters are indicated in the following disorders: In congestion and functional derangement of the liver, in catarrhal jaundice, in gall stones or inspissated bile and in chronic hepatic enlargement in which serious structural change of the amyloid or other degenerative process have not taken place. In chronic engorgement of the portal system, in catarrhal conditions of the mucous membrane of the intestines and congestion of the hæmorrhoidal vessels; also in habitual constipation, incipient hæmorrhoids and even in the earlier stages of tropical diarrhœa. In diseases of the spleen, such as chronic hyperæmia and enlargement, resulting from malarial poisoning. In chronic gastric catarrh; in cardialgia or gastralgia, dyspepsia, dilatation of the stomach. In those forms of albuminuria which take place as the result of abdominal plethora and changes in the blood due to malarial poisoning. In renal and vesical gravel; in lithiasis; also in chronic catarrh of the bladder and in hyperæmia

of the prostate gland, and in some hyperæmic conditions of the womb and its appendages. In gouty conditions, whether expressed in affections of the abdominal or other viscera ; in arthritic effusions and in thickening of the tissues and sheaths of the tendons surrounding the joints ; in excema, and in fact, in any of the other modes in which the gouty diathesis manifests itself, also in general abdominal plethora and in obesity, whether of the abdomen or of the body generally.

In the earlier forms of diabetes there seems little doubt, from the testimony of eminent authorities, that benefit may be derived.

But Carlsbad is to be especially recommended to those who, after protracted residence in India or other malarial climate, suffer from occasional recurrences of malarial fever, with consequent derangement of function and even alteration in the normal condition of liver, spleen and other abdominal viscera ; who, without suffering from any positive disease, are failing in health, have impaired digestion, distended condition of the abdomen, increasing fatty deposit in the omentum and a tendency to fatty degeneration of the muscular system generally, who find themselves languid and depressed, unequal to much physical or mental exertion, shew indications of incipient anæmia, suffer from dyspnœa, from rheumatic or gouty pains, irregular action of the bowels, congestion of the portal system and distended hæmorrhoidal vessels—a state of things, perhaps in some cases aggravated by excesses or irregularities of diet, or the neglect of due precautions as to the quantity or kind of alcoholic stimulants.

Such are the conditions in which an early recourse to Carlsbad and a judicious selection of some intermediate health resort before returning to the ordinary mode of life are likely to confer benefit. Indeed, almost every European not the subject of organic disease, who has spent many years in India, would do well to avail himself of the resources of Carlsbad before he enters upon the new course of life which lies before

him, whether he be returning to India from furlough or retiring to spend the remainder of his life at home.

It is almost needless, after what has been said, to add that diseases of the brain or spinal cord, severe forms of fever and suppurative processes, intestinal or pulmonary tuberculosis, malignant growths and syphilis, diseases of the heart and blood vessels, hæmorrhagic diathesis, excessive menstruation, profuse hæmorrhoidal flux and well-developed hæmorrhoids, severe anæmia or cachexia and atrophy, cirrhosis or malignant disease of the liver and ascites, Bright's disease or albuminuria depending upon renal disease, the advanced forms of diabetes and neurasthenia, will derive no benefit.

I have not attempted in this brief sketch to point out all the conditions that might be benefited by Carlsbad, but have selected those in which it may be profitable to my countrymen in India. My object is simply to call attention to it as a health resort which appears to me to be very suitable for many of them, and to discourage notions, which I fear still prevail, that risk of excessive spoliation by the waters and depletion by starvation is incurred, for neither of these results need be apprehended, whilst the local advantages of climate, scenery and healthful recreation are such as contribute greatly to the therapeutic value of the mineral waters and consequent restoration to health.

[*From the* Obituary Notices *of the* Proceedings of the Royal Society, Vol. 55.] 1894

Sir William Aitken was born at Dundee on April 23, 1825, and received his early education in the High School of that town. He commenced the study of medicine under his father, a medical man in Dundee, and by attendance in the wards of the Dundee Royal Infirmary. In November, 1842, he matriculated in the University of Edinburgh, where, after attending lectures in the faculty of arts, and having complied with the requirements of the medical curriculum, he took the degree of Doctor of Medicine in 1848, his thesis on a pathological subject on that occasion gaining for him a gold medal. He also became a Licentiate of the Royal College of Surgeons of Edinburgh in the same year. Thence he appears to have proceeded to the University of Glasgow as Demonstrator of Anatomy under Dr. Allen Thomson. This office he continued to fill in conjunction with that of Pathologist to the Royal Infirmary of Glasgow up to 1855. Here he laid the foundation of that knowledge of disease which procured for him the appointment as Pathologist to the Hospitals of the Bosphorus, which were then filled by sufferers from the army in the Crimea. In association with the late Dr. Lyon he published a report on the diseases of the Crimea, which appeared in a Blue-book in 1856, and it is, and always will be, a valuable work of reference in regard to the maladies which were so fatal to the troops in that campaign.

On the foundation of the Army Medical School, which commenced its existence in 1860 at Chatham (afterwards transferred to Netley), and was an outcome of the experience of the Crimean War, Dr. Aitken was made Professor of Pathology, an appointment for which his early training and matured experience in the military hospitals in the East peculiarly fitted him, and which his subsequent career at Netley has abundantly justified. This duty he continued to perform until April, 1892, when failing health compelled him to rest from work. His final resignation of the chair had been fixed for the close of the session in July, 1892; but renal disease, from which he had for some time suffered, to the profound regret of his colleagues and numerous friends, terminated his valuable life on June 25, 1892.

Of the value of Aitken's work at the Army Medical School, as well as to medicine generally, it would be difficult to speak too highly. As a teacher he was pre-eminently successful in his method of imparting

knowledge ; his reasoning was scientific and practical, his demonstrations lucid and convincing, and he must be gratefully remembered by hundreds of medical officers who owe much of their knowledge of disease, its causes and results, to his teaching.

A friend and colleague of Dr. Aitken writes :—"In the *post-mortem* room he was *facile princeps*. I never saw any one to compare with him at work of this kind. It was a lesson none could forget to see him conduct a *post-mortem* and hear his exposition of what he saw. He had great powers of work, and was a student in his own way all his life. His book held the field for many years as a student's text-book." And, again, "He was scrupulously honest as a writer; strove always to give every man his due."

Aitken's services to medicine were not restricted to his work as a teacher and examiner. He made many contributions of importance to the literature of medicine, and to that branch of it which he had made peculiarly his own—pathology. Up to the last he continued his labours, and at the time of his last illness was engaged in the publication of a descriptive catalogue of the Museum of Pathology now located at Netley. It is to be hoped that some competent successor will undertake to carry on and complete the work thus unfortunately interrupted.

It is sufficient to name the chief of his writings to indicate the debt due to this great pathologist, and to show how earnestly he laboured to contribute his share of knowledge to the common stock. The following are the best known :—

"On Inflammatory Effusions into the Substance of the Lungs as modified by Contagious Fevers," 1849. (2) "Contributions to Pathology." (3) "On the Pathology of the Diseases of the Troops in the East during the Russian War, 1855–56," in conjunction with Dr. R. D. Lyons. (4) "On the Diseases of the Troops in the East during the Russian War, and on the Climate of Scutari, on the Bosphorus," 1857. (5) "Medical History of War with Russia," 1857. (6) "On the Persistent and Pernicious Influence of the Residence in Bulgaria on the Subsequent Health of the British Troops in the Crimea." (7) "On conducting *Post-mortem* Examinations at Coroners' Inquests," 1857. (8, 9, 10) "On the Pathological Connexions and Relations of Epidemic Diseases in Man and the Lower Animals, with special reference to the relationship between the health of man and the condition of his food," 1857. (11) "Analytical Review of the Transactions of the Medico-Chirurgical Society of London, vol. xii," 1859. (12) "Critical and Analytical Review of Recent Works on the Pathology of Vaccination, and its Protective Influence from Small-pox," 1857. (13) "Analytical and Critical Review of the First Decennium of the Pathological Society of London," 1858. (14) "Handbook of the Science and Practice of

Medicine," 1858 [this has reached its seventh edition]. (15) "On the Growth of the Recruit and the Young Soldier" [now in its second edition]. (16) "On the Doctrine of Evolution in its Application to Pathology," 1885–86. (17) "On the Animal Alkaloids."

Aitken was a man of somewhat reserved and reticent speech, but what he said was pregnant with science and common-sense. He was of a most kindly, genial nature, loyal to his profession, devoted to his friends, and just to all. His personal character endeared him to every one. His frank, straightforward mode of expressing his opinions, tempered as they were by sound judgment and discretion, made him respected and esteemed, and contributed, in no small measure, to the formation of the reputation of one of that small but remarkable group of men to whom the great Army Medical School owes its rise, development, and success. Regretted universally by friends and colleagues, it is in the great School of Military Medicine, which owes him so much, that his loss will be most keenly felt.

His merits have not escaped some recognition. He was made a Fellow of the Royal Society in 1873. In 1887 he received the honour of knighthood. The Universities of Edinburgh and Glasgow, in 1888, conferred on him the degree of LL.D., whilst on the walls of the ante-room at Netley is an excellent portrait presented by his numerous friends, admirers, and pupils.

May his memory long continue to influence coming generations of medical officers in the School he loved so well!

J. F.

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE.

We are indebted to Sir Joseph Fayrer, a life-long friend of Professor Huxley, for the following note on his life and character:

"It was with profound grief that I heard of the death of my old and much respected friend, T. H. Huxley. The loss of the foremost biologist of this or any other country will be universally deplored, for he has for many years had a predominant influence on the progress of biological science and the expansion of scientific teaching which was not surpassed by even that of his friends, Darwin and Tyndall, and has contributed beyond all others to the advancement of natural knowledge and the promotion of the scientific methods of investigation of the problems of life. To this end, indeed, the whole strength of his surpassing intellect was steadfastly, through good and evil report, devoted, and the results have been recorded in language so incisive and convincing as to leave on all who have followed his teaching the impression of incontrovertible truth, and the conviction that in this department of knowledge he was *maestro di color che sanno*. I have always felt it to be a great privilege to have known him so well during early life. The friendship and affection in which I held him never diminished, though after his departure in 1846 I had no opportunity of seeing him again until my return from India in 1872, when I had the gratification of finding that on his part the feeling was unchanged, whilst on mine it was enhanced by the admiration with which I regarded his great natural powers and the unwearying labour in scientific research which had raised him to the pre-eminent position he has since occupied.

"We were fellow students from 1844 until he joined the Navy in 1846, and it was during that time that I learnt to recognise his great intellectual power and the keen interest he took in the physiological lessons of Wharton Jones and other teachers. It was not surprising that he took honours at the London University, and it was with a feeling of confidence that I looked forward to a distinguished career for him when he departed with Captain Owen Stanley in the *Rattlesnake* on his scientific mission.

"That he entered the naval service I have always felt proud to think was due to my persuasion, for after consultation one day I urged him to apply to the Director-General of the Navy. He did so, and the result was an appointment to Haslar, and subsequently to the *Rattlesnake*. Doubtless had he selected any other career the result would have been the same, but as some of his earliest contributions to science arose out of the expedition to the South Seas, one cannot but regard that as having in some degree determined the course and direction of his future work.

"To inculcate veracity of thought and action, to subordinate to it reasonable or unreasonable ambition for scientific fame, to develop and organise true scientific education, and to combat whatever might oppose it, were his aspirations, and that by which he hoped to be remembered by posterity. To quote his own words: 'I should not count these things as marks of success if I could not hope that I had somewhat helped that movement of opinion which has been called the New Reformation.'

"But he will be remembered not only as a great original thinker, investigator, and promoter of biological science, but as a man of the highest principle and unswerving devotion to truth, a genial and charming friend, a keen but courteous controversialist, and one who illuminated all he said or did with the brightness of a remarkable personality, and a goodness of heart that endeared him to all who knew him and now lament his loss."

British Medical Journal July 6. 1895

Valedictory Address,

Delivered at the termination of the Seventieth Session of the Army Medical School, Netley,

July 31. 1895

By Surgeon-General Sir Joseph Fayrer,
K.C.S.I., M.D., F.R.S., Q.H.P.,

HONORARY PHYSICIAN TO THE PRINCE OF WALES; LATE PRESIDENT OF THE MEDICAL BOARD, INDIA OFFICE.

It is rather more than twenty years since my official relations with the Army Medical School at Netley began, and this is not the first time I have had the honour of addressing the surgeons on probation on an occasion similar to that for which we are now assembled, for I find that on April 1st, 1875, I addressed them at the opening of the school, and on Feb, 3rd, 1879, I had the privilege of presiding at the distribution of prizes. During the intervening period of twenty years I have had the opportunity of watching the progress of the school, have done so with great interest, and have noted with much satisfaction the gradually increasing good influence it has exerted on the medical department and through them the medical services generally. It is a subject for congratulation that the school continues to prosper, despite the vicissitudes and changes it has undergone; its very existence even has been menaced, but happily it has survived these dangers and has so well maintained its prestige and asserted its utility that we may hope that (the need for its existenee being so well established) any future changes will be only such as tend to the expansion of the teaching of those subjects especially relating to the duties of the military medical officer which were originally contemplated when it was founded, and which can nowhere be so well taught as they are here. Deeply interested in the service in which my life has been passed, and knowing by experience how valuable is the character of the education and training imparted here, I have always wished to see the teaching of

this school extended over a longer period of time and its sphere of utility enlarged, and have hoped that in process of time its benefits might be made available for other medical men destined for a public career in the sanitary and civil medical services of the country, including the colonial, as well as for the officers of the Army and Indian Medical Department. I am much impressed with the belief that such a modification in the present system would be of great benefit alike to the Service and the individual medical officers, for, however perfect may be the scheme of education in the great civil medical schools and universities, however highly specialised may be the teaching of certain subjects in any one of them, that combination of special subjects peculiarly needed in the public medical services, especially in the Army and India together with instruction in military and administrative questions—to say nothing of the advantages of *esprit de corps* acquired by association in a great school before entering the actual service—can never be imparted or acquired as thoroughly elsewhere as it can here. In my humble opinion, the time now allotted for residence at Netley, considering the varied and special nature of the curriculum, is hardly sufficient, and I do not hesitate, therefore, to say that I trust the period of study for probationers may ultimately be extended. Officers having this longer training and special education would be even better qualified than they are at present to meet all emergencies and to carry out the scientific investigations so imperatively demanded in these days, when great problems of etiology as well as of preventive medicine are exciting so much interest and are straining to the utmost the resources of practical scientific research for their elucidation. In this respect this great school is peculiarly well endowed and admirably equipped for the means of such teaching, and the teachers are alike forthcoming ; more time only is required to do full justice to both. And here I would, through you, urge on your successors the supreme importance of diligent use of the period of probation here. The time is so short, the subjects are so important, that without close and unremitting work and attention the necessary standard may not be attained and disastrous failure result. This in my experience of Netley is rare, but it *does* occasionally happen, and I would urge you to impress on your friends and successors the importance of bearing it in mind.

When I last addressed the young officers (1879) who had just gained their commissions, I expressed my hope and

belief that better prospects were foreshadowed and might be anticipated for the Medical Services Times had been, and indeed still were, unfavourable, a feeling of disquietude and unrest prevailed, and there was a sense of general dissatisfaction with the existing condition of things. That there was reason for this I think cannot be doubted, nor can I say it is altogether extinct now; but I ventured then to suggest that possibly the difficulties did not all arise from outside, and that to a certain extent, perhaps, the obstacles might be found within the Service itself, and that. if it were so, it behoved the medical officers to see to it that such internal causes should be removed. I reminded the young officers that the social and educational influences of a great institution like Netley are calculated to foster and develop (amongst other things) that *esprit de corps* which so greatly conduces to real stability in any department of the public services. I pointed out also that the position of the military and Indian medical officer offers such advantages as ought to command a supply of the *élite* of our Universities and medical schools. All this I repeat to-day; and I am glad to think that as time advances there has been, on the whole, a favourable change. Many men of high culture are competing for the appointments, but indications are even now not wanting of a doubting confidence, for I am told that the competition is less keen than it has been; still, the general tone and feeling in regard to the Services have improved. Unfavourable conditions have been mitigated if not removed; the importance of the medical officer's work is more appreciated and his true place in the great military organisation better understood, and, as a consequence, more authority is attached to his opinion and more weight to the importance of his duties, which are concerned with not merely sickness and wounds, but the well-being and sanitary condition of those under his care. Until a few years ago the military status of the medical officer was insufficiently defined. It is true he held what was called "relative" or "comparative" rank, but this, however, served but imperfectly to endue him with that authority which is essential to his position as an important and indispensable officer of the Army. It had long been felt that his status required more exact definition, but there were always certain obstacles to this which stood in the way. It was argued, I believe, that however necessary the medical officer might be—and that he is so was not disputed or denied, at all events by reasonable persons—yet that substantive military rank could not appropriately be conferred

upon him. This view, it would seem, could only have arisen from a misconception of the true nature of a commission. The idea that the title of Lieutenant, Captain, Major, or Colonel could only be held by that particular branch of the Service whose duty it is to direct the combative energies of the soldier was surely a mistaken one, for it is in the power of the Sovereign to confer such distinction on anyone, and it is conferred on officers of the military service who have no immediate connexion with mere combatant action, as is amply demonstrated by the fact that the officers who control the Commissariat, the Army Service Corps, nay, even the band master, now can and do, hold substantive commissions in one or other of those ranks. If it be considered necessary and possible that these officers should be so commissioned, it is difficult to understand why the same advantages should have been withheld from the medical officers, who, being so closely connected with all that concerns the health, discipline, the well-being and effective condition generally of the Army, need such warrant for their authority as much as do those of any other department. The concessions that have been made doubtless conduce to the interests of the Service by placing the medical officer in a more assured position and by defining more clearly the substantive rank and authority which he holds, though I must confess one has difficulty in appreciating the advantage of such a cumbrous title as that of "Brigade-Surgeon-Lieutenant-Colonel." Time, however, will probably modify such complex designations. Invidious distinctions implied in the terms "combatant" and "non-combatant" can have but little real significance in these days, when the records of almost every action fought or position defended show how equally risks are shared by the medical and the other officers, whilst the number of Victoria Crosses worn by them is a curious comment on the use of the term "non-combatant" (with its present meaning) as applied to the medical officer. But let me repeat what I said on a former occasion, which is that your military rank gives you no title, nor does it call upon you in ordinary cases to assume the place or duties of the combatant officer, and I hope I need not even hint at the impropriety and bad taste of assuming any position to which your own, as members of a learned profession, should make you indifferent, for, whatever your military rank may be, you are first of all medical men. Still, withal, you are soldiers, and it may happen, as it often has done, that you have in an emergency to take the place of your combatant brethren. Should it fall to your lot

to do so you will be prepared to show that you are as ready for this as for any other duty. Two brilliant examples are even now before you in the cases of Surgeon-Major Robertson, who as a political officer contributed to the defence of Chitral, and of Surgeon-Captain Whitchurch, who risked his own life and fought his way through the enemy, carrying and protecting his mortally wounded comrade. Both these officers have recently received recognition of their services. If you confine yourselves, therefore, to your own distinct sphere of duty, which is ample and sufficient, the benefit of your influence will be appreciated; if you overstep it you will be in a false position; your efforts for good will be minimised and your counsels neglected if not ignored. Remember also that though your status in the Service is now—as it should be—assured by your military rank, so much of your influence for good depends upon personal character that you should endeavour to maintain that at the highest standard.

Gentlemen, let me now congratulate you upon the successful termination of your career at Netley, and upon having achieved the great object of your ambition—your commissions in the Service; and especially I would congratulate those of you who have obtained prizes bearing the names of Sidney Herbert, Edmund Parkes, Ronald Martin, and De Chaumont—names that will be honoured and respected wherever they are mentioned and medical science is appreciated. They have conferred lustre on the Service generally and upon this school in particular. They deserve well of their country, and they may rightly be held up to you and other young men as models for imitation. Let these prizes be an inducement to you to endeavour to follow in the steps—long and laborious they may have been—which led to their great distinction, and which will lead you too, perhaps, if you follow in them, to a similar pre-eminence. These prizes should also be an incentive to you to endeavour to maintain and increase the prestige which they now reflect upon you, whilst at the same time they should serve to remind you of the efforts by which that success was obtained and the obligation imposed upon you of continuing to merit it. To those of you—and it is of necessity the majority—who have not been equally successful I would say that you have won one great prize in securing your commission; there are still others to be won in the career before you, and many advantages to be gained, if you will only work perseveringly and seize the opportunities when they present themselves. Both

India and the army offer many paths to eminence—India especially does so—and to one or other of these goals you will surely attain, if having determined to do so at the outset you earnestly persevere. It has been said that the public services offer little inducement to exertion ; that they present, after all, but a somewhat dull level of monotonous equality ; and that talent, energy, zeal, and special devotion to one or other of the branches of science are but of litttle avail and lead to nothing. This is not the case—least of all is it so in India, where many and varied appointments are attainable and await the earnest worker. They are, at least, filled at the present moment by medical officers, and though in this respect, perhaps, India is not so fertile as it may have been in past times, it still offers opportunities of professional and scientific advancement which are excelled by those of no Service in the world. I am afraid I may not hold out to you such prospects of honours and distinctions as fall to the lot of some other departments of the public service, but even in this respect there are signs of improvement, and it is possible that in the future such recognitions as are accorded to military, political, and civil officers of long and distinguished service may fall to your lot likewise. But, after all, when you adopted the profession of medicine as a career you did not contemplate such rewards as the chief object of your ambition. It was rather, I take it, the exercise of a noble profession, the advance of knowledge, the welfare of your fellow-creatures, and the satisfaction of feeling that you aim at the almost god-like power of relieving suffering, saving life, and promoting the sanitary, moral, and material welfare of your fellow subjects that influenced you, and to this you may in a measure certainly attain. Great wealth you will perhaps not acquire, but a competency you may certainly rely on—sufficient, at any rate to relieve you from those carking cares and pecuniary anxieties which so often retard the pursuit of knowledge and the progress of the individual. In most cases you may rightly look forward to being able to provide for your families and, under favourable circumstances, even to acquire a certain amount of wealth. You will, at all events, be able to lead useful and honoured lives, whilst you will acquire "troops of friends," and it may well be that from among you shall arise another Parkes, Falconer, Waring, Hooker, Longmore, Maclean, Aitkin, De Chaumont, or David Smith, or perhaps even a worthy successor to the great biologist and philosopher who has so recently gone to his rest—for Huxley and the men I have mentioned, to whom

might be added many others, at least began their lives and laid the foundations of future eminenee in one or other of the medieal serviees.

On the last oeeasion upon whieh I had the privilege of presiding at a meeting of this kind I had but reeently beeome offieially eonneeted with this sehool as a member of the Senate. The duties were most eongenial to me, for I had always taken mueh interest in the edueation and training of medieal offieers. The antieipations that I then formed in referenee to the objeets and results of this great sehool have been fully justified; and I now, having eeased to oeeupy that offieial position, look baek with great pleasure upon the years that have passed in eonnexion with it, and the regret that I feel on the elosing of my offieial eonnexion with the sehool is tempered by the knowledge that my sueeessor, Surgeon-Colonel Hooper, will strive to guard and promote your interests with all the zeal, earnestness, and ability whieh eharaeterised him in India, and have led him to the position he now oeeupies. I have watehed with keen interest the eareer of your prede-eessors on these benehes, and have been gratified to learn how thoroughly many of them have done eredit to the teaehing they have reeeived here; whilst I deeply regret that this almost general rule has not been without exeeption. The severanee of my offieial relation with the sehool in no way diminishes the interest I take in it; and I look forward with pleasure to the privilege of being present on sueh oeeasions as these, and of still watehing its progress and the influenee that it will, I hope, eontinue to exert in elevating the Medieal Department and maintaining it in the position it should take amongst the other great publie serviees of this eountry.

It only remains for me now to impress briefly upon you the importanee of the duties that you will be ealled upon to perform. To those of you who are destined for the military serviee of this eountry will be entrusted the eare of the health of our soldiers at home and abroad. Upon you it will devolve to advise the authorities upon all sanitary questions and whatever eoneerns the physieal well-being of the army under your eare. In the event of war—and who ean say how long we may remain at peaee?—the treatment of the sick and wounded will be your speeial eare. To you, also, it will fall to investigate the laws that govern the origin and diffu-sion of epidemie and other forms of disease, and all that eoneerns the soldier's health. Already, through the influenee of your predeeessors, the death-rate of our soldiers in India has been redueed within the last fifty years from something

like sixty to thirteen per mille, and no doubt this mortality is susceptible of further diminution, whilst side by side with the reduced death-rate will continue an amelioration of the conditions of life generally. Nor will your duties be limited to those of a purely military medical character, for there are some special spheres of action and appointments open to those who may aspire to them. To those of you who are destined for the Indian Medical Service similar but even wider prospects are open, for there your duties will be of a still more varied character. Problems concerning disease, the laws regulating the rise and spread of cholera, fever, and other epidemics—their pathology, etiology, and therapeutics—still need and claim further investigation and research. Or, apart from medicine and hygiene, the whole range of natural science, involving zoology, botany, meteorology, and ethnology, afford matter for investigation and fields for research which are yet comparatively unexplored. Your education and scientific training fit you to take up and deal with these subjects, and I would suggest to you the advantage of doing so—i.e., of having some other occupation than that which is concerned with medicine alone. You have thus before you, to whatever Service you belong, the prospect of an interesting, useful, and profitable career. The measure of your success will be that of your own exertions. If you exercise the ordinary precautions for preserving health you may have every reason to hope that you will pass through it successfully—and, I trust, satisfactorily—and may return to this country in health and vigour and with large experience with the prospect of doing useful work at home—it may be in this great school. I will not detain you longer than to say that in bidding you farewell I wish you every prosperity and success, and trust that your highest aspirations may be realised.

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ON FALMOUTH AS A WINTER RESORT.

PRESENTED TO

THE SECTION OF MEDICINE.

At the Annual Meeting of of the British Medical Association in Carlisle, July, 1896.

BY SIR JOSEPH FAYRER, BART., K.C.S.I., M.D., F.R.S.,
Honorary Physician to Her Majesty the Queen and to H.R.H. the Prince of Wales.

A SEVERE and prolonged attack of bronchitis having, in the opinion of my medical advisers, rendered it necessary that I should leave London during the winter months of 1895-96. and being anxious to avoid foreign travel and residence, I decided to try whether what I wanted could not be found nearer home, and accordingly, on the recommendation of Sir E. Sieveking, sclected Falmouth as a winter residence where one might hope to escape the raw damp cold and fogs of London, and at the same time perhaps find immunity from the sudden and violent alternations of temperature which are so dangerous and trying to those who have suffered from, or become liable to, bronchitic affections. The result has been so satisfactory, that I feel it is a duty to record my experience and call attention to a health resort which is perhaps too little known, but which, if appreciated as it deserves to be, might prove of great benefit to many who would gladly avail themselves of the opportunity of obtaining the required change, and of avoiding a journey for which they are physically unfitted, and residence in a foreign country for which they have no inclination.

The chief desideratum in a climate, for those who find it expedient to seek change in the winter, is that it should be equable, sheltered from prevailing winds, and sunshiny, a combination not always to be obtained, at all events within a reasonable distance by land or sea. The south of France and the Riviera are much sought after, but though the climate is genial and bright with sunshine, and the scenery charming, the daily range of temperature is often considerable, and the risks of chill are great, whilst the mistral and bise are very trying.

It scems hardly to be known that the conditions so essential to the invalid exist in our islands; and yet it is so, for the south coast of Cornwall presents them in a marked degree. Why this ignorance should prevail is hard to understand, secing that since 1816, when Dr. Paris called attention to it,

the peculiar advantages of this part of England have been most clearly pointed out by Clarke, Sieveking, and latterly by Dickinson,[1] who, in a most able and interesting paper, has described the climatic conditions of Cornwall. But, as in the case of many other health resorts, the very fact of being so near home would seem to be an objection; like the prophets, they have no honour in their own country, and waters and climate are sought for in Germany, the Riviera, etc., at the cost of much trouble and considerable inconvenience, which could be found equally well in the neglected health resorts of our own islands.

It is especially to one of these that I now wish to draw attention, and, as I speak from personal experience, others, I hope, may be induced to seek and to find similar advantages to those I derived from a winter spent in Falmouth; though my remarks are limited at present to Falmouth, I believe they apply almost equally to other parts of the southern aspect of Cornwall.

I am glad to find that the claims and advantages of our own health resorts are now engaging the attention of the medical profession, and if a result be to direct public opinion in their favour it would be a great benefit alike to invalids and health resorts.

The county of Cornwall is a promontory, including the most westerly as also the most southerly portion of the mainland; the northern shore is washed by the Atlantic Ocean, the southern by the English Channel. It is about 81 miles in length, about 40 miles wide at the base, diminishing to about 20, the average breadth, and again towards the Land's End becoming much less. The south coast is about 100 miles from France, the north coast about 2,000 miles from North America. It has thus the advantage of an insular climate, which is further modified by the influence of the Gulf Stream, which raises the temperature of the water on both sides to a higher degree than that of the eastern shores of England. A range of hills and high ground runs through its entire length, forming a ridge or plateau of an average height of 600 feet, descending sometimes to 300 feet towards the Land's End. This shelters the southern coast line.

The mildness of the climate of Cornwall is due not only to its southerly but also to its westerly situation, owing to the course of the isothermal lines. The presence of the Gulf Stream tends also to increase the rainfall, which is undoubtedly high compared with that of other parts of England, these physical conditions tending, as in the case of insular climates, to produce mildness and equability not found in other parts of England.

Falmouth is in lat. 50° 9′ N., long. 5° 4′ W., and is situated on an arm of the sea which indents the south coast, forming one of the finest harbours in the world, which, with St. Mawes, Truro, and other creeks occupies an area of about 10 square miles, with a coast line of 71 miles, 58 of which are occupied by cliffs. Many portions of this great harbour are protected by elevations rising several hundred feet. The town of Falmouth lies on the north-western shores of this harbour in a crescentic form, rising in terraces on the hill behind, whilst that portion which is known as Gillingvase, extending on to the headland of Pendennis, has a southern

[1] *Climates and Baths of Great Britain*, being the Report of a Committee of the Royal Medical and Chirurgical Society of London.

aspect. The whole coast line is exceedingly beautiful, especially the headland upon which Pendennis Castle is built, and which forms a most charming drive, returning through the town to Penryn at one extremity of the harbour; on the opposite side, round the point of Trefusis, the so-called Fal river extends to the town of Truro, affording most picturesque scenery. On the other side of the harbour are St. Just and the town and castle of St. Mawes, with its creek, terminating ultimately at St. Anthony's Point and lighthouse, which with Pendennis Point facing it forms an entrance of about a mile in width to this magnificent and well-sheltered harbour.

The neighbourhood of Falmouth offers most varied and interesting scenery, undulating and elevated ground, with lovely country seats and richly cultivated gardens. In all of these sheltered places, especially on the southern slopes of the peninsula, trees grow luxuriantly in the valleys, but on the higher, more exposed, and wind-swept portions the trees are stunted and gnarled, their growth evidently being repressed by the prevailing south-westerly winds. Along the south coast sandy beaches alternate with cliffs—beaches upon which an infinite variety of shells are washed up by the sea, and which are composed almost entirely of the detritus of shells.

The equability and mildness of the climate are remarkably illustrated by the numbers of exotic, and even subtropical, plants which thrive, many of them flowering even in the winter. The myrtle, fuchsia, hydrangea, escalonea, dracæna chamaerops, citron, azalia, agave, bamboo flourish, whilst the rhododendrons and camellias flower throughout the whole winter in the open air. Many other plants also which would only thrive under shelter in other parts of England live in the open throughout the whole year, whilst the gardens supply vegetables such as broccoli, peas, asparagus, etc., much earlier than any of those of other parts of the United Kingdom.

With all these attributes of climate and scenery, it seems remarkable that greater advantage should not have been taken of Falmouth and other parts of Cornwall, but it is to be hoped that the testimony borne by those who have benefited by them will gradually induce others to avail themselves of them as winter resorts, especially when it is an object to avoid a long and weary journey, and foreign residence far from home and friends. But it may be well to say here that with all its natural advantages, Falmouth has done but little yet to encourage visitors to winter there, for although it possesses some most excellent accommodation in a few hotels and boarding houses, this is sufficient to provide only for a limited number. It has scope for much accommodation, especially along the southern coast, whilst the addition of certain attractions such as are found in other watering places, and certain alterations and improvements of the town facing the harbour would offer further inducements to visitors. There can be little doubt were public opinion but given an impetus in this direction, and were Falmouth prepared to accommodate more visitors, its merits would soon receive general recognition.

The advantages of Falmouth are not merely those of a winter resort, for whilst it is more equable in winter than any other place in England, or even than the south of France, so in summer the mean temperature is lower than it is in many

Meteorological Observations at Falmouth Observatory for the Winter 1893-94.

	November, 1893.	December, 1893.	January, 1894.	February, 1894.	March, 1894.
Mean dry temperature ...	45.9°	45.2°	41.8°	45.3°	47.6°
Mean maximum temperature	49.6°	49.9°	46.1°	48.5°	51.8°
Mean minimum temperature	41.1°	40.1°	37.6°	41.1°	41.2°
Mean range	8.2°	9.8°	8.5°	7.4°	10.6°
Extreme maximum	57.8°	55.6°	51.8°	53.1°	58.5°
Extreme minimum	32.0°	26.2°	19.4°	30.8°	34.9°
Extreme range	25.8°	29.4°	32.4°	22.3°	23.6°
Humidity	83.0° per cent.	87.0° per cent.	88.0° per cent.	87.0° per cent.	81.0° per cent.
Mean temperature of sea water	—	—	48.1°	48.1°	48.1°
Sunlight—bright (Campbell Stokes apparatus)	77.4 hours	76.1 hours	67.8 hours	91.2 hours	186.2 hours
Rainfall	4.305 inches (No rain on 15 days)	5.760 inches (No rain on 16 days)	4.595 inches (No rain on 4 days)	3.410 inches (No rain on 10 days)	2.170 inches (No rain on 18 days)
North wind	10 days	5 days	6 days	5 days	6 days
South wind	4 ,,	11 ,,	11 ,,	10 ,,	6 ,,
East wind...	8 ,,	3 ,,	3 ,,	3 ,,	7 ,,
West wind	8 ,,	12 ,,	11 ,,	11 ,,	12 ,,

Meteorological Observations at Falmouth Observatory for the Winter 1894-95.

	November, 1894.	December, 1894.	January, 1895.	February, 1895.	March, 1895.
Mean dry temperature ...	49.5°	46.3°	37.9°	34.3°	44.8°
Mean maximum temperature	53.5°	50.1°	42.7°	38.6°	50.5°
Mean minimum temperature	45.1°	43.0°	33.8°	30.8°	39.4°
Mean range	8.4°	7.1°	8.9°	7.8°	11.1°
Extreme maximum	56.2°	54.9°	51.7°	49.6°	61.7°
Extreme minimum	37.2°	30.8°	23.8°	21.8°	32.2°
Extreme range	19.0°	24.1°	28.9°	27.8°	29.5°
Humidity	87.0° per cent.	85.0° per cent.	85.0° per cent.	76.0° per cent.	86.0° per cent.
Mean temperature of sea water	54.2°	51.1°	46.7°	40.7°	43.4°
Bright sunlight (Campbell Stokes apparatus)	62.3 hours	66.6° hours	86.6 hours	83.9 hours	170.7 hours
Rainfall	8.555 inches (No rain on 10 days)	4.545° inches (No rain on 9 days)	6.420 inches (No rain for 7 days)	0.085 inches (No rain on 25 days)	2.835 (No rain on 16 days)
North wind	5 days	9 days	11 days	10 days	9 days
South wind	10 ,,	7 ,,	6 ,,	4 ,,	8 ,,
East wind	5 ,,	3 ,,	6 ,,	13 ,,	3 ,,
West wind	10 ,,	12 ,,	8 ,,	1 ,,	11 ,,

Meteorological Observations at Falmouth Observatory for the Winter 1895-96.

	November, 1895.	December, 1895.	January, 1896.	February, 1896.	March, 1896.
Mean dry temperature ...	51.0°	45.9°	44.6°	45.3°	49.2°
Mean maximum temperature	52.2°	49.8°	48.5°	50.4°	53.0°
Mean minimum temperature	46.7°	42.3°	41.1°	41.2°	43.8°
Mean range	8.5°	7.5°	7.4°	9.2°	9.2°
Extreme maximum	60.6°	54.5°	55.0°	56.6°	57.3°
Extreme minimum	36.9°	31.9°	30.2°	32.3°	34.9°
Extreme range	23.7°	22.6°	24.8°	24.3°	22.4°
Humidity	88.0° per cent.	91.0° per cent.	89.0° per cent.	80.0° per cent.	84.0° per cent.
Mean temperature of sea water	54.8°	51.1°	—	—	—
Bright sunlight (Campbell Stokes apparatus)	67.6 hours	33.5 hours	51.1 hours	81.9 hours	116.1 hours
Rainfall	6.155 inches (No rain on 6 days)	9.905 inches (No rain on 2 days)	1.295 inches (No rain on 18 days)	0.665 inches (No rain on 20 days)	3.280 inches (No rain on 8 days)
North wind	1 day	3 days	4 days	2 days	3 days
North-east wind	3 days	2 ,,	6 ,,	2 ,,	—
East wind...	1 day	3 ,,	2 ,,	5 ,,	—
South-east wind	9 days	4 ,,	5 ,,	8 ,,	1 day
South wind	1 day	1 day	1 day	,,	4 days
South-west wind	11 days	8 days	6 days	3 ,,	10 ,,
West wind...	3 ,,	7 ,,	3 ,,	5 ,,	8 ,,
North-west wind	1 day	3 ,,	4 ,,	—	5 ,,
				4 days	

other health resorts in England, the range in all these places being much greater than it is in Falmouth. The mean average difference of day and night temperature for the last three winters was 8.6°, and, as Sir E. Sieveking has pointed out in the BRITISH MEDICAL JOURNAL of December 14th, 1889, "To those who wish to escape from the summer heat of other localities, and to those who wish for an equable temperature during the winter months, Falmouth offers attractions not readily found elsewhere." It is often urged that, admitting its mildness and equability, the climate of Falmouth is necessarily relaxing and enervating, but from my personal experience, which extends through the winter months, this is not the case as compared with other places on the south coast.

With regard to moisture generally, the very conditions that induce the mildness, that is, the proximity of the Gulf Stream and the condensation resulting from the raised backbone of the peninsula, naturally produce a greater rainfall, but the rain when it does fall rarely continues for long, and the greater part of most days is fine, while the water runs off or is quickly absorbed by the porous and gravelly soil. As to mists, those that occurred during my stay there were rare and were sea mists. On no occasion did snow fall during that winter, only twice was there hoar frost on the ground in the early morning, whilst on only four occasions did the thermometer fall below the freezing point. I am well aware that this winter was a peculiarly mild one all over Great Britain, but the relative equability claimed for the climate of Falmouth will be shown by reference to the statistics of other years of which two are given on the preceding page.

As an illustration of this continuous mildness of the climate throughout the winter, I may say that with few exceptions I was able to spend the greater part of the day out at sea in an open sailing boat. Strong breezes, even amounting to gales of wind, were not infrequent, but they were rarely ever so severe as to prevent my going out, whilst three or four miles from the shore it was quite perceptible that not only was the sea water warmer than the air, but that the air itself was warmer than that on shore. Throughout the whole of this time, notwithstanding frequent exposure to strong winds and to wetting by sea water, my health steadily improved, and by the time I left—early in April—traces of bronchitis had almost entirely disappeared.

Walking down to the boat in the morning, passing gardens in which rhododendrons and camellias were blooming in the depth of winter, one forgot that one was still in England, and it was a subject of congratulation to find that such conditions existed in our own islands.

Amidst all these advantages it must be admitted that the east wind, when it did blow, was not exempt from the evils which generally characterise it, but even these seemed to be somewhat tempered, and, though unpleasant enough, making it sometimes desirable that an invalid should remain in the house, it was by no means the prevalent wind, as will be seen from the preceding tables, which I owe to the kindness of Mr. Kitto, the director of the Observatory, and which also indicate the chief climatic conditions which prove the fitness of Falmouth for a winter residence.

It may be noted that in the winter of 1894-95, a cold year, the lowest point attained by the thermometer was 21.8° in February, and the mean minimum in February, the coldest

month, was 30.8°, and the mean maximum 38.6°; while in 1895-96, a mild winter, the lowest temperature reached was 30.2° in January, and the mean minimum in January, the coldest month, was 41.1°, and the mean maximum 48.5°.

In the winter of 1894-95 the east wind blew for five days in November, 3 in December, 6 in January, 13 in February, and 3 in March; while in 1895-96 it blew 1 day in November, 3 in December, 2 in January, 5 in February, and not at all in March, the prevalent wind being south-west.

On the basis of 10 years' records, Falmouth is found to be considerably favoured in the matter of sunshine, standing second only to Jersey of all stations of the British Islands where records are kept.

A comparison of the mean temperature of the winter months of Falmouth with Cannes, Mentone, Montpelier, Nice, Pau, and Madeira, shows that it compares not unfavourably with those Continental resorts.

	November.	December.	January.	February.	March.
Falmouth ...	47.8°	44.3°	44.1°	45.1°	44.7°
Penzance ...	47.26°	45.17°	45.21°	45.20°	45.32°
Scilly	49.8°	46.7°	46.3°	46.9°	46.4°
Cannes	52.6°	46.3°	48.0°	48.8°	57.0°
Montpellier ...	50.7°	45.7°	42.1°	44.8°	48.9°
Mentone ...	54.0°	49.1°	48.7°	49.1°	52.8°
Nice	53.8°	48.5°	47.1°	46.2°	51.8°
Pau	47.0°	42.8°	41.2°	43.6°	48.8°
Madeira... ...	64.96°	62.58°	61.89°	62.70°	64.0°

On the whole, I think it will be found that Falmouth merits the preference assigned by all who know it, whilst the many advantages arising from proximity to the sea, the beautiful and intercsting surroundings, the mild and genial atmosphere, bright sunshine, lovely flowers and vegetation, which suggest the geniality of spring in the midst of winter, all combine to confer on it qualites such as are rarely met with, and are not the less valuable that they are easy of access and near home.

I heartily commend Falmouth to those who seek a winter residence, and only hope it may prove as satisfactory to them as it did to me and mine. If the contribution of my personal experience to that of others who have realised its benefits could induce its kindly, hospitable, and genial inhabitants to add to what they have already done for this charming place, by making certain alterations and improvements and by adding to the accommodation, which, however excellent, is all too limited, I feel sure that not only would the interesting old town and suburbs be benefited, but a lasting boon would be conferred on numbers of invalids and delicate persons who would gratefully avail themselves of a health resort which in all respects equals, if it does not surpass, many of those now frequented abroad.

We are indebted to Sir Joseph Fayrer, Bart., for the following tribute to Mr. Pollock's memory :

"It was with most profound regret that I heard of the death of my dear and much valued friend and colleague, George D. Pollock. I had seen him a few days previously, when, though he made no complaint about his health, I was struck with the marked change in his appearance ; still I little thought I was not to see him again.

"The medical profession has recently sustained severe losses by death, but none will produce a greater blank in the roll of distinguished men than that of the great surgeon and thorough English gentleman now so much deplored.

"Mr. Pollock's life will no doubt be written in detail by someone who has known even better than I the great merits which throughout a long carecr have placed him in the front rank of his profession, and gained for him the confidence, esteem, and affectionate regard in which he has been so universally and deservedly held.

"But I, who have known him intimately for the last twenty-four years, have been closely associated with him in public duties, and have received many kindnesses at his hands, had learned to regard him as the best and truest of friends and the wisest of counsellors, and to know that every action of his life was influenced by the highest and noblest principles. I cannot, therefore, refrain from a brief expression of the esteem in which I held his noble personal character, his pre-eminence as a surgeon, his high sense of the importance of his duties, the unremitting zeal, ability, and care with which he performed them, and, above all, the loyal and affectionate nature which endeared him to the friends who will ever hold him in loving remembrance.

"In offering this last tribute of respect I know I shall have the sympathy of many of my brother officers in the services with which he was intimately associated, and in which he was much interested, not only as an examiner, but by family connection.

"The name of Pollock has been borne by many distinguished men, including the great Field Marshal, his father, but by none has it been more usefully and honourably represented than by him who, though now taken from us in the fulness of age, we had hoped might have continued his useful career for some years to come."

"*Multis ille bonis flebilis occidit.*"

Brit. Med. Journal Feb 20 1897

ADDRESS

TO

Prize Winners of Municipal Schools of Science and Technology, and Art,

DELIVERED BY

SIR JOSEPH FAYRER, BART.,

K.C.S.I., M.D., F.R.S.,

IN

THE DOME, BRIGHTON

On the 14th April, 1898.

Brighton:
THE SOUTHERN PUBLISHING COMPANY, LIMITED.
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ADDRESS

TO PRIZE WINNERS OF MUNICIPAL SCHOOLS OF SCIENCE AND TECHNOLOGY, AND ART,

DELIVERED BY

Sir JOSEPH FAYRER, Bart., K.C.S.I. and F.R.S.

IN

THE DOME, BRIGHTON.

On the 14th April, 1898.

For several reasons it was with very great pleasure that I accepted the invitation of the Chief Magistrate and Corporation of Brighton—conveyed to me through my old friend, Alderman Sir J. Ewart—to be present on the interesting occasion of this Meeting of the Municipal School of Science and Technology and School of Art for the purpose of presenting prizes to the students who were successful during the year 1897.

(1), My first reason is that I have had old associations with Brighton, which I have always liked; (2), two of my sons commenced their education in one of those excellent schools for which Brighton has always been so remarkable; (3), I was closely associated with Sir Joseph Ewart in India, where I had the opportunity of seeing how thoroughly well he

carried out the important duties entrusted to him, and was glad to see that the same activity, energy, and intellectual power had been devoted to the good of Brighton since he wisely made that charming health resort his home.

My first duty is to make my cordial acknowledgments for the honour conferred on me, to offer at the same time my warm congratulations on the successful inauguration of this important centre of intellectual activity and education and to express a sincere hope that the objects contemplated may in the future be fulfilled in the realization of the far-reaching benefits which it is calculated to confer, and of which its present condition justifies hopeful anticipation.

So far as I have been able to learn from public report, as well as from personal observation, the Brighton Municipal School of Science and Technology is entitled to take a high place among numerous other Institutions of the same kind which have been established in different parts of England, as the outcome of the Technical Instruction Acts of 1889 and 1891, which contemplate not only scientific, technical, and commercial, but also the higher education of the youth of our country; and it is no small satisfaction to note that whilst technical instruction is mainly contemplated, the preliminary culture implied in general education is also to a certain extent required as a condition of admission to the technical classes, which classes students cannot attend until after the age of 14 to 16 years, and also that opportunity is given—nay encouraged—of pursuing general culture and education to the highest point, even to that of obtaining a University degree.

I observe with further satisfaction that the curriculum of this important School includes in its extensive programme four main departments, namely (1), Mechanical Engineering and Applied Mathematics; (2), Physics and Electrical Engineering; (3), Chemistry, General, Technical, and Commercial; (4), Natural Science, and in addition lectures on such subjects as Modern and Classical Languages, Domestic Science (for women), and Commercial Subjects.

Besides this extensive curriculum there are University courses by means of which the student may pursue his studies until he attain the standard which fits him for matriculation, the intermediate examination in Science, and the Preliminary Scientific (M.B.), or for degrees in Arts or Science in the London University. In any case it is enacted that the advanced technical subjects shall not be undertaken until the student gives evidence that he has been prepared, by preliminary culture, to study them with advantage. In short, till he shall have learnt how to learn. To this end there is a Preparatory Division in which junior students may be grounded in Arithmetic, Algebra, Geometry, Trigonometry, Mensuration, Drawing, English Composition, etc., to enable them to proceed in those subjects for which they seem intellectually most fitted.

Further I note that with the object of extending the utility of this Institution evening classes are provided during the winter for those who may be debarred by circumstances from availing themselves of the more systematic regular instruction of the day classes, in which the curriculum is much the same as that of the day classes, but with a larger

development of applied science, art, and trade subjects, to meet the wants of those who wish to supplement the practical side of their daily occupation by a scientific knowledge of the theory on which it is based. The programme, however, is so wide and varied, that to all over 14 years of age, whose time, means, and opportunities are limited, the occasion is offered of improving their general education and of acquiring knowledge of such subjects as may be specially useful in their particular walk of life. I am glad to find that already about 600 of both sexes evince their appreciation of the opportunities thus offered by availing themselves of these most comprehensive evening classes.

All this had, up to September, 1897, to a certain extent been carried on by means of (1), The Art and Science School, now constituted a School of Art alone: (2), by Technical Classes held in temporary premises: (3), by Science and Art Classes in the Grammar School: but you owe it to the munificence and wisdom of the Municipality that the subjects thus formerly taught in a scattered form are now gathered together in one centre and constitute part of the general curriculum of the new Municipal School of Science and Technology of Brighton, and it is to this that I would particularly call attention as a new departure in the general scheme of national education which offers so much promise. The teaching must of necessity be better conducted in this large building specially adapted and fitted for the purpose, with its numerous class-rooms and laboratories, an efficient staff of teachers, and all the special apparatus required for the various subjects taught than it could have been under the former regime. In its new capacity, and

with its fresh adaptation to the purposes for which it is intended, it is to be hoped that it will obtain the support and sympathy it so eminently deserves.

Ladies and gentlemen, an Institution so constituted, if conducted according to the sound principles advocated and the promises held out—as there is good reason to believe is the case in these Technical Colleges founded under the Acts quoted—must confer an indescribable boon on the rising generation, and there is reason to feel assured that the diffusion of education resulting from them is gradually manifesting itself in the general elevation of the social condition and life of the nation to a higher plane.

Competition is keen among the nations of Europe, and if Great Britain is to maintain the predominant position to which we fondly think she is entitled, we cannot afford to let her drop behind in the race for knowledge. Therefore these Technical and Scientific Schools with their concomitant means of general education may be hailed not as rivals or opponents of our ancient and historical Schools and Universities, but as natural and welcome complements and coadjutors, and we think that they are calculated to aid, not impede, each other in the great national work of education, whilst it may well be that the stimulus of friendly rivalry will contribute to the progress and welfare of all.

Nothing is more remarkable in the present age than the progress made in general education, and nothing is more calculated to increase the happiness and prosperity of the nation. Among many subjects for the congratulation

offered to our beloved Queen on the completion of the 60th year of her happy and auspicious reign, few could have been more gratifying to her than the assurance of the general spread of education among her people, which was such as to give stability to her rule, and increase the happiness and prosperity of her subjects; and let it be remembered that the general diffusion of knowledge not only tends to advance the moral and intellectual status, but that it is improving the physical health and the value and duration of life of the population, for it is teaching the importance of observing those rules of living on which physical and consequently moral health depend.

My own professional instincts move me to note with interest that Hygiene forms a part of the curriculum, and that from this as from many other centres will go forth the teaching of the simple but important rules on which public health depends.

The Rev. J. Hocking remarks, "Three-fourths of the sickness and ailments and weaknesses of the world are wastes and burdens—wastes and burdens to the sufferers, wastes and burdens to society, and wastes and burdens that need not be."* I myself said some years ago, and the words hold good now as they did then, "If the people could be taught to believe in the efficacy of pure air, pure water, cleanly dwellings, temperate habits, proper food and clothing, and could be induced to make efforts to secure them; and if they could be taught to regard infective diseases as the scourge of uncleanliness and of their own disregard of the simple laws of health . . . . the result would be, not

* Modern Problems and Christian Ethics.

only greater usefulness and happiness, but better health and the saving of money. Preventible diseases, the result of insanitary conditions, still kill many thousands yearly—at least one hundred and forty thousand; and, considering the large number of cases of illness for each death, it has been calculated that seventy-eight million five hundred thousand days of labour are lost in this country annually, which represents a loss in money of seven million seven hundred and seventy-five thousand pounds per year."

It is to be hoped that the knowledge which will be diffused among the people by such Institutions as this will gradually tend to mitigate such conditions as I have just described, and to obviate this wasteful expenditure of health and life, and that in so doing it will promote not only the moral, but the physical welfare of the people.

Let me now congratulate you, the prize winners, on your success, but let me advise you to regard your prizes not so much as proofs that you are better than your less successful competitors, but rather as incentives to further diligent pursuit of the work you have begun so well. Remember that many qualities go to make up a really good man, and that, after all, most of those are not susceptible of being tested by a school examination. Prizes, however, as indications of successful work, perseverance, and greater capacity than that of others for assimilating knowledge are most valuable and honourable distinctions, and will be specially so if they increase your interest in your studies and stimulate your energy in future work.

To those who have tried for but not won prizes, I would say, be not discouraged ; your next efforts will probably be more successful, and, at any rate, the real prize is the knowledge you are attaining and will continue to attain, if you persevere. The possibilities at your age are great. Study, perseverance, and determination are sure in the end to produce their natural result, success.

Let me congratulate you all on having such a complete store-house of knowledge to resort to. You cannot now, perhaps, realize the advantages you possess, but I and many others far younger than I am, are very sensible of them, and can remember the time when no such opportunities as you have were available. Yet even in those times, by perseverance and diligent pursuit, considerable knowledge could be acquired, and it is well to remember that some of our greatest men of science and men of action were mainly self-taught.

Michael Faraday, for example, a bookseller's apprentice at the age of 13, at the the age of 21 was Professor Humphry Davy's assistant in the Royal Institution, and at the age of 32 was Fullerian Professor at the Royal Institution. He had no Technical School to train him for this important scientific post. His published memoirs on experimental researches in Electricity and Magnetism, on Chemistry and Physics, on Forces of Matter, on Metals, and on many other Scientific Subjects, placed him in the foremost rank of men of Science. It is probable that he would, could he speak now, be the first to advocate the importance of such an Institution as you possess. One might mention

many other great men who by their energy and perseverance in self-cultivation have attained to positions hardly less important.

But in further illustration of this let me refer to some remarks made by Charles Dickens in 1858, when he was giving the prizes at the Institutional Association of Lancashire and Cheshire, in Manchester. After certain depreciatory comments upon Literary Societies and Mechanics Institutes in general, he is led to express his admiration and approval of the Institution with which he was then concerned. He says, for example, that having looked over some of the examination papers, which comprise all the keys that open all the locks of knowledge, he felt devoutly grateful that they had not been submitted to him to answer as he certainly could not have done it. "And yet it is to be observed and seriously remembered that those examinations were undergone by people whose lives had been passed in a continual fight for bread and whose whole existence had been a constant wrestle with

> 'Those twin gaolers of the daring heart,
> Low birth and iron fortune.'

"That the questions, in fact, had been replied to, not by persons like himself, the business of whose life was with writing and with books, but men the business of whose life was with tools and machinery." He then goes on to illustrate this by describing some of the prize-winners. "There is a piecer at mule-frames, who could not read at eighteen, who is now Arithmetic teacher in the Institution in which

he himself was taught, who writes of himself that he made the resolution never to take up a subject without keeping to it, and who has kept to it with such an astounding will that he is now well-versed in Euclid and Algebra, and is the best French scholar at Stockport." Among the delegates from the local Societies there was a man "who worked when he was a mere baby at a hand-loom; who began to teach himself as soon as he could earn 5s. a week; who is now a botanist acquainted with every production of the Lancashire valley; who is a naturalist, and has made and preserved a collection of the eggs of British birds and stuffed the birds; who is now a conchologist, with a very curious and in some respects an original collection of fresh-water shells, and has also preserved and collected the mosses of fresh water and of the sea: who is worthily the President of his own local Literary Institution, and who was at work this time last night as foreman in a mill."

With what I have quoted to you from this great writer I am sure you will all agree, and you will feel what gratification it would afford him and others of his way of thinking had they had the opportunity of witnessing the formation of such Institutions as your own, Institutions which are the outcome of the necessities of the age and the demand for knowledge that is inherent in the people. You will see the bearing of it upon yourselves, but of course the illustrations of the struggling labourer or the poor mechanic developing into a teacher and a man of Science are of partial application only to an Institution of this kind, but they emphasize the principle that success will depend rather upon your own personal exertions than upon your environment, though

these personal exertions, when aided by such means as are here placed at the disposal of the student, must render the accomplishment of his purpose more certain and complete. To a large number of you probably the course of education in this school will be like that in other public schools, and your special attributes and fitnesses will be directed in the line of the least resistance, whilst at the same time it will be satisfactory to all to feel that its benefits are not limited to any one class, but that it extends the advantages of its culture to all who are ready and willing to receive them. There is, however, some danger—let us hope you may avoid it—that the very ease with which you can attain this knowledge, thus, as it were, brought to your feet, may prove an obstacle by diminishing your efforts. Accept what I and so many others of a former generation can tell you are your great advantages thankfully, and avail yourselves of them fully. So train yourselves—whatever walk in life you may adopt and for which you may be prepared here—that you may inspire all with whom you come in contact with confidence in your own capability and respect for these great Technical Institutions.

I think I ought not to detain you longer. It only remains for me to wish you much success in your future studies and in the walk of life to which they may lead you, and to hope that you will in the future look back with gratitude and pride to the Alma Mater which did—as will assuredly be the case if you avail yourselves of her teaching—so much for you and equipped you with means of maintaining—I trust with success—the struggle for existence,

which is daily becoming harder in this great, ever-increasing population, whether at home or in our Colonies, to whose greatness and development it may fall to the lot of some of you to contribute.

Obituary.

Deputy-Surgeon-General S. B. PARTRIDGE, C.I.E., Q.H.S.

Bengal Medical Service (retired).

On May 11th, in the presence of relatives, brother officers, and friends, the mortal remains of Samuel Bowen Partridge were laid to rest in the cemetery at Norwood.

This distinguished medical officer was born at Cardiff in 1828 and was educated at King's College, London, where he had a most brilliant career, during which he gained many prizes. After passing the Royal College of Surgeons he entered the East India Company's service on the Bengal establishment as an assistant surgeon in the year 1852. Shortly after his arrival in India he was ordered to Burmah to join the Bengal Field Force, and after performing excellent service in a variety of ways, on his return to Bengal he served as civil surgeon and also with a cavalry regiment. On the outbreak of the mutiny in 1857 he served with a cavalry regiment in Oude, and when the siege of the Residency of Lucknow commenced he served throughout the whole of that eventful period in Dr. Fayrer's house in the garrison, where his energy, activity, and professional knowledge were of the greatest benefit. He was present with the expedition under Colonel Burmester, in which several officers were killed, and he also accompanied the ill-fated expedition to Chinhut, where he had a narrow escape of losing his life. Subsequently he distinguished himself as field-surgeon in the operations under the Commander-in-Chief at the recapture of Lucknow. For these services he received the brevet promotion of surgeon, was allowed to count a year's service, and received the thanks of Government in general orders.

The state of his health after all these exceptional services rendered it necessary for him to return to England. After a short stay, during which he became a Fellow of the Royal College of Surgeons, he resumed his duties in India, and was then appointed to the Medical College of Calcutta, in which he had on a former occasion officiated for a short time, as Professor of Anatomy and Surgeon of the Medical College Hospital. He was also an Examiner in the University of Calcutta, a member of the Senate, and for a short time President of the Medical Faculty of the University. Subsequently, on the retirement of Dr. Fayrer, he succeeded to his appointment as First Surgeon and Professor of Surgery in the Medicl College Hospital, which appointment he continued to hold with the greatest distinction. In addition he had an extensive practice in Calcutta until 1880, when he retired from the service.

After his return to England Deputy Surgeon-General Partridge was appointed member of the India Medical Board at the India Office, where he rendered most valuable service, until loss of sight made his resignation of that appointment necessary, to the deep regret of his colleagues and friends.

The news of his death will be received in India, as it has been in this country, with the greatest sorrow. He was held in the highest esteem by everyone who knew him; no man was ever more deservedly loved and respected than he was. His intellectual powers were great, and he was as much characterised by the breadth as by the accuracy of his knowledge; most laborious in his studies, most persevering in pursuing to the end any object which he had undertaken; with the profoundest mathematical problem as with the simplest piece of mechanics he was equally at home. As an anatomist he was unrivalled in the clearness of his demonstrations; as a surgeon he was remarkable not only

for his skill as an operator but for his great powers of diagnosis, nor was he less remarkable for his capacity for dealing with disease in its tropical and other forms, whilst his firm, gentle, and patient method of treatment inspired all who came under his care with confidence and affection. Notwithstanding his great attainments and his remarkable intellectual power, he was as humble as a child. The simplicity of his character was not less marked than its strength. He was naturally beloved by all his brother officers, associates, and pupils, and in fact by everyone who knew him. Whilst so gentle and tender in every way, a rock was not firmer than he where firmness was required. Not even Bayard himself, or Outram (with whom he was justly compared) better deserved the title of "Chevalier sans peur et sans reproche."

On Deputy Surgeon-General Partridge's retirement from the India Office the Government signified their approval of his services by creating him a Companion of the Indian Empire. He had previously been made an Honorary Surgeon to the Queen, and had also received a medal and clasp for Burmah, and a medal and clasp for the siege and for the recapture of Lucknow.

J. F.

British Medical Journal.
May 14. 1898

[*From the* Obituary Notices *of the* Proceedings of the Royal Society, Vol. 63.]

Richard Quain, who died on March 13, 1898, at the age of 81, was born on October 30, 1816, at Mallow-on-the-Blackwater, co. Cork, in which county his family was one of the best known and most respected. His father, John Quain, was a younger brother of Richard Quain, of Ratheahy, whose sons, Jones and Richard, were distinguished for their knowledge of anatomy and surgery, and John Richard as a lawyer and judge in the Court of Queen's Bench. The father of the subject of this notice married, in 1815, Mary, daughter of Michael Burke, of Mallow, a member of an ancient and honoured Irish family.

After early education at Cloyne, Richard Quain was apprenticed to a medical practitioner in Limerick, where he acquired a knowledge of many of the essentials of medical practice. In 1837 he entered the University College of London, where his two cousins were, the one Demonstrator, the other Professor of Descriptive and Practical Anatomy, from whom he seems to have received much sympathy and valuable instruction. In this School of Medicine he studied with much diligence, and his perseverance and keen powers of observation obtained for him many distinctions.

In 1840 he graduated as M.B. of the University of London, obtaining high honours in physiology, surgery, and midwifery. He continued to gain much experience in the appointments of Resident Surgeon or Physician at the hospital, and in 1842 he obtained the degree of M.D. at the London University, receiving a gold medal and certificate of special proficiency. He was soon afterwards elected a Fellow of University College.

In 1848 he became Assistant Physician to the Hospital for Diseases of the Chest, at Brompton, where he was associated with Drs. Walsh, Theophilus Thompson, and Cotton. In 1855 he was elected Physician to this hospital, and his connection with it as a Consulting Physician continued till the time of his death. He was also Consulting Physician to the Seaman's Hospital at Greenwich, and to the Consumption Hospital at Ventnor.

In 1851 Quain was elected a Fellow of the Royal College of Physicians, and was identified with it till the time of his death; for he was a member of the Council, Censor, Lumleian Lecturer, Senior Censor in 1877, Harveian Orator in 1885, and Vice-President in 1889. In 1888, on Sir William Jenner's retirement, he contested the Presidency with Sir Andrew Clark, who, however, was elected, though only by eight votes, in a large meeting.

In 1863 Quain was elected as Crown nominee of the Medical Council, and continued in that post till his death. He was a moving spirit in all the work of that body; he was a member of many committees, serving with great distinction on the Pharmacopœia Committee, which he seemed to make his special care, though most active on several others. The services he rendered to this Council in the various offices he held were most valuable, and the result was his appointment, on the death of Mr. John Marshall in 1891, to the post of President, to which he was unanimously re-elected on the expiry of his first term of office in 1896, when he gave a valuable address, clearly setting forth the questions in which the Council were interested and his own practical and statesman-like view of the methods of dealing with them. His predecessors in this important office were Sir Benjamin Brodie, Joseph Henry Green, Sir George Burrows, Sir George Edward Paget, Sir Henry Acland, and John Marshall, none of them more devoted to the duties or more efficient as President of the Council than himself.

Sir Richard Quain's literary work and his researches into various departments of medical science were, if not numerous, very important. As a member of the Royal Commission appointed in 1865 to consider the question of rinderpest or cattle plague, in which he was associated with Lord Spencer, Lord Cranborne (now Marquess of Salisbury), Lord Sherbrook, Dr. Lyon (now Lord) Playfair, Dr. Edmund Parkes, and Dr. Bence Jones, he took a prominent part, and was an earnest advocate of the stamping-out measures recommended by the Commission, which, though strongly opposed at the time, subsequent events have proved to have had the result of saving large sums of money to the nation. He was a frequent contributor to the 'Saturday Review,' to the 'Lancet,' and other medical journals; whilst his treatise on "Fatty Degeneration of the Heart" in the 'Transactions of the Medical and Chirurgical Society' for

1850, expanded into a more elaborate article in his 'Dictionary of Medicine' some years later. His reports in conjunction with the staff of the Brompton Hospital, compiled for several years, of the cases treated there; some valuable contributions to the 'Lancet' of 1845 on Bright's disease, and to the 'Edinburgh Monthly Journal of Medicine' on "Injuries of the Valves of the Heart," together with his Lumleian Lectures given before the College of Physicians in 1872 on "Diseases of the Muscular Walls of the Heart" were, and are still, regarded as authoritative writings.

But the great work with which Quain's name will ever be associated is that of the 'Dictionary of Medicine,' on which the years between 1875 and 1882 were spent, and which reappeared in a second edition in 1894, enlarged and brought up to the knowledge of the present time. For this cyclopædia of medical science he had carefully selected the contributors from the most eminent members of the medical profession, whose communications were all revised and, in some cases, modified by himself. His own contributions, especially those on "Fatty Degeneration of the Heart," "Angina Pectoris," "Aneurism of the Heart," "Diseases of the Bronchial Glands and General Remarks on Disease" are not the least valuable. The work, in short, having filled a want long felt by the profession, gained their entire confidence. To his able coadjutors, Dr. Frederick Roberts, Dr. Mitchell Bruce, and Mr. John Harold he gave due credit, and to their untiring devotion to the work its success is in great part—as he himself would have acknowledged—to be attributed.

Not the least interesting of Quain's contributions to medical literature was his Harveian Oration, delivered before the Royal College of Physicians in 1885, in which he dealt eloquently with the healing art in its historic and prophetic aspects.

In 1871 Dr. Quain was, for his eminence as a physician, and for scientific research into subjects connected with medicine, elected a Fellow of the Royal Society. He was also a member of the Senate of London University elected by the Queen, LL.D. of Edinburgh, M.D. (Hon.) of Dublin and of the Royal University of Ireland, and also a Fellow (Hon.) of the Royal College of Physicians of Ireland. He was Fellow and President of both the Medical and Chirurgical and the Pathological Societies, to the 'Transactions' of which he made several valuable contributions, and member and President of the Harveian Society of London.

In 1890 he was appointed Physician Extraordinary to the Queen; and on New Year's Day, 1891, received the well-merited honour of a baronetcy of the United Kingdom. This becomes extinct with his death, as Sir Richard Quain leaves no son. Isabella Agnes, Lady Quain, to whom he was married in 1854, was the only daughter of

Mr. George Wray, of Clcasby, Yorkshire; she died, to his profound grief, a few months after the baronetcy had been conferred upon him. Four daughters survive him.

Sir Richard Quain was much and justly esteemed by his profession and by the public. The kind-heartedness and geniality of his nature, his amusing and epigrammatic conversation, his wide knowledge of men, and his unwearying sympathy and kindness, made him popular not only with the younger as well as the older members of his profession, but with society generally, and in the Athenæum and Garrick Clubs, of which he was a well known member, whilst the bright and cheering effect of his presence in the sick room was always beneficial. Few men have been more endowed with the faculty of endearing themselves to their acquaintances, friends, and patients; and few will be more regretted than the warm-hearted, genial Irishman and physician who has been taken from us, though not until advanced age had afforded the world full opportunity of appreciating his merits.

J. F.

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The Sanitary Institute Congress at Birmingham 1898

INAUGURAL ADDRESS,

By Sir JOSEPH FAYRER, Bart., K.C.S.I., LL.D.Edin. & St.And., M.D.Edin., F.R.C.P.Eng., Q.H.P., F.R.S.

(Fellow.)

Delivered September 27th, 1898.

My first duty on taking the chair is to acknowledge the honour conferred on me in selecting me as President of this Congress; and my next to offer a cordial welcome to all who propose to take part in its proceedings, and to express a hope that they may not only derive pleasure and profit from them, but at the same time confer benefit upon the cause they advocate.

It is also my duty to convey the thanks of the Congress to the Right Honble. the Lord Mayor and Corporation for the hospitality and courtesy which has been extended to it in the important city of Birmingham, a great and populous centre of activity, to which the problems to be considered in the forthcoming conferences must be of deep and abiding interest.

It is not without misgiving that I have assumed the office entrusted to me, for when I think of those who have been my predecessors, I feel painfully conscious of my inaptitude for the post that they have filled so well. I must confess, moreover, that I found some difficulty in selecting a topic suitable for an inaugural address, but can only hope that my shortcomings may be redeemed by the proceedings of the various sections into which the Congress is divided.

I shall not attempt to deal with any special branch of

preventive medicine or hygiene, but shall endeavour to take a brief general survey of progress during recent times. It should be a retrospect full of interest, offering scope for many addresses on special branches of sanitary science—such, indeed, as I hope will characterise the coming Conference.

We live in an age of progress and discovery. Intellectual activity has never been greater, scientific research never more profound or far-reaching, whilst the practical applications of the discoveries of science are not less remarkable. Among many subjects of interest which were laid before our gracious Queen on the completion of the sixtieth year of her glorious reign, few perhaps if any afford better ground for congratulation than the improvement in the vital statistics of her people, as shewn by reduced death-rate, enhanced expectation of life, decline in some of the most potential death-causes, and the almost total disappearance of others.

In effecting this improvement, the Institute which I have the honour to represent and which holds its 17th Annual Congress this year has taken an important part. It was the outcome of the impulse given to sanitary science by the Public Health Act of 1875, which itself was a result of the growing conviction that public health was a subject which demanded more consideration than it had hitherto received.

At a public meeting held in London in July, 1876, presided over by His Grace the Duke of Northumberland, it was resolved that the sanitary condition of the country is still very unsatisfactory, that further legislation is necessary with a view to its improvement, and that for the purpose of collecting and imparting information upon all matters connected with the subject of "Public Health," a society be formed to be styled "The Sanitary Institute of Great Britain," and a committee was appointed to give effect to the terms of the resolution. Since then the progress of the Institute thus founded has been uninterrupted, and its influence for good has steadily increased. In the same year, 1876, the Parkes Museum was founded at University College as a memorial to Dr. E. A. Parkes, first Professor of Hygiene at Netley, and in its galleries were exhibited various hygienic appliances for the purpose of affording information by the objective method of teaching. Its Council originated and managed the International and Sanitary Exhibition at South Kensington in 1881, which was presided over by the Duke of Edinburgh. It was in 1882 incorporated as a society, its treasures were transferred to the present premises in Margaret Street, where it was joined by the Sanitary Institute, and the two institutions having a common object worked harmoniously together and practically became one. In August,

1888, they were formally amalgamated and re-incorporated under the title of The Sanitary Institute. In 1887, just before the amalgamation took place, the Institute, in conjunction with the Society of Medical Officers of Health, invited the International Congress of Hygiene and Demography to meet in London, which it did in 1891 with great success.

The object which the Institute has kept steadily before it from the outset has been the advancement of sanitary science by the promulgation of sound scientific and practical teaching of those principles on which health depends, by which life is prolonged, and the physical and thereby the moral welfare of the people promoted.

One of its earliest steps, taken in 1877, was to establish examinations for Local Surveyors and Inspectors of Nuisances, in order that the officers who had to carry out the provisions of the Public Health Act should be competent for their duties. The Council also arranged to hold an Annual Congress in some provincial town, in order that papers should be read and discussions take place, whilst, at the same time exhibitions of sanitary appliances were arranged as object lessons, and judges appointed to examine the exhibits and award prizes. Since the amalgamation with the Parkes Museum the same work has been continued, with the addition of periodical meetings, at which papers are read and discussed, the publication of transactions, and advanced examinations; while to aid the important teaching work it was carrying on, it collected and published the works of Farr and of Simon, which deal exclusively with the problems of sanitary science. It has gradually accumulated an excellent library, and instituted lectures and practical sanitary demonstrations for the benefit of medical men and of sanitary inspectors, which subsequently were considerably extended and more elaborately organized. Under the patronage of the Duchess of Albany and the Presidency of the Dukes of Northumberland and Westminster, and latterly of the Duke of Cambridge—who had already been connected with the Institute for fourteen years, and had not only displayed great interest in its work, but had rendered it valuable assistance, and under the guidance of such men as Sir Douglas Galton, Earl Fortescue, Sir Francis Powell, Mr. Rogers Field, Prof. Corfield, and others who had been its early supporters and founders, it steadily developed its purpose of diffusing practical sanitary knowledge throughout the country and attained its present influential position.

An idea may be gained of the scope of the operations of the Institute by reference to the epitome of the work done in 1897, which was as follows:—

	London Lectures and Examinations.	Total Attendance.
4	Sessional Meetings for discussion of Sanitary Subjects	285
36	Lectures to Sanitary Officers	2,251
2	Special Demonstrations, Inspection of Meat ...	140
34	Practical Demonstrations for Sanitary Officers ...	925
2	Examinations in Practical Sanitary Science ...	34
2	Examinations Sanitary Inspectors	213
38	Classes brought to the Museum	1,674
	Other persons visiting the Museum (estimated) ...	17,500
	Provincial Examinations.	
8	Examinations Sanitary Inspectors and Practical Sanitary Science	316
	Congress and Exhibition at Leeds.	
6	Sectional Meetings	706
8	Conferences	850
3	Addresses and Lectures	956
	Exhibition open for 23 days, at which a number of Lectures and Demonstrations were given ...	75,790

All this is effected entirely by private enterprise, unaided by any subsidy either from Government or other public authority, by which it is from time to time consulted, and to which its services are most willingly rendered. As an illustration of the progress made it may be stated that when the first Congress took place in 1877, there were 150 members and the income was £240. In 1897 the members were 2,100 and the income £6,000. In 1877 five candidates were examined for certificates, in 1897 521 were examined, of whom 300 obtained certificates.

Such is a brief outline of the history of The Sanitary Institute. But it is by no means the only source of instruction in matters relating to Hygiene and Preventive or State Medicine, for all our Medical Schools and Universities, the Army and Navy Medical Schools at Netley and Haslar, and many technical schools now give instruction in those subjects, and the Universities and Colleges of Physicians and Surgeons attest the fitness of candidates for the Diploma of Public Health. One great national reproach, moreover, has lately been removed by the foundation, by private enterprise of the Institute of Preventive Medicine, under the presidency of Lord Lister, with which is amalgamated the College of State Medicine. The object of this Institution is to search out the causes of disease, a knowledge without which we cannot hope to deal effectively with modes of prevention. The Medical

Departments of the Navy, the Army, and the Local Government Board, the Army Sanitary Committee, the Royal Institute of Public Health, many municipal and rural Health Societies, and Societies of Medical Officers of Health, are actively employed in extending the practical application of the knowledge imparted by the various educational institutions as well as by individual research.

The time at my disposal does not permit of tracing in detail the history of the growth of Sanitary Science from times of ignorance and superstition to its present well-established foundation on a scientific basis, but I may at once say that it is indeed only comparatively recently that preventive as distinguished from curative medicine has assumed the position of a science at all; it is now from a hygienic point of view, the more important of the two, though the difficulties attending its application are still considerable and largely such as arise from ignorance and incredulity.

Half a century ago the great mass of the population lived and died under conditions which violated all the now well known principles on which health depends; prejudice, ignorance, and vested interests stood in the way of progress, and but little effort was made to correct the one or remove the others; government looked on with indifference; the people knew little and thought less of the efficacy of pure air, pure water, cleanly and uncrowded dwellings, temperance, and other conditions which are now well known to be essential to health. They had no idea that infective disease is but too frequently the scourge of uncleanliness, overcrowding, and disregard of simple laws of health.

Under the influence of such reformers as Chadwick, Parkes, Richardson, Simon, Southwood Smith, Sutherland, Bristow, Buchanan, Netten Radcliff, De Chaumont, Corfield, Thorne, Notter, Seaton, L. Parkes, Ballard, Power, A. Hill, Armstrong, Russell, Littlejohn, Cameron, Smith, Ransom, and others, to say nothing of Sanitary Engineers such as Rawlinson, Galton, Rogers Field, Hawkesley, Mansergh, etc., measures which were regarded as mere theories or fads of no practical value, are now accepted as of cardinal importance. Statesmen have learnt to realise that Sanitary Science comes well within the sphere of practical politics, and that it is an important part of the duty of executive governments, whether general or local, to protect the people from disease which may be prevented or controlled.

Numerous Acts of Parliament have been passed, such as the Public Health Act of 1875, Rivers Pollution Prevention Act 1876, Public Health (Water) Act 1878, Acts for Housing

the Working Classes 1885 and 1890, Infeetious Diseases Notification Aet 1889, Infectious Diseases Prevention Aet 1890, Isolation Hospitals Aet 1893, Publie Health Aet for London 1891, and many others. Offieers of Health, Sanitary Engineers and Sanitary Inspeetors have produced a better state of things; the poor are no longer left to be a law unto themselves on such matters. Publie health is eared for in a sense whieh was utterly unknown in the past; houses are better built, sewerage, drainage and ventilation are provided for, the land is better cultivated, the subsoil better drained; the absolute importanee of pure drinking-water is reeognised, food is more varied and more nutritious in its eharacter, elothing is better adapted to climate; and were all the existing official provisions enforeed, little would remain to be desired on the part of the Exeeutive government; but as some of these Acts are permissive, not eompulsory, and as others are utterly negleeted, mueh of the benefit they might eonfer is lost.

Though edueation has done mueh as far as the better elasses are eoneerned, and upwards of 200 millions have been spent on sanitary work, with great benefit to the publie health, popular teaehing and example, and the general diffusion of education, are still neeessary in order to eonvinee the proletariat of what so intimately eoncerns their vital interests. The death-rate is susceptible of further diminution, expeetaney of life may be enhaneed, and the general conditions of living and exemption from eertain forms of disease are by no means as perfeet as they might be; tainted water is still drunk, as was illustrated by the eondition of Maidstone and King's Lynn last year, where an extraordinary visitation of typhoid fever was traeed to impure water, shewing either that legislation was imperfeet or that its provisions had not been duly observed. Chimneys still vomit forth their smoke and chemieal fumes, rivers are still polluted, eesspools and imperfeet drains, badly eonstrueted, ill-ventilated houses, and so on, still defy alike sanitary law and common sense; and it will perhaps not be until the more eomplete organisation of the publie health administration under a Minister of Publie Health be effeeted, that the full benefits of sanitary legislation will be realised and the people attain to that standard of health and duration of life for whieh they have a right to hope.

Even our great cities with all their improvements leave mueh to be desired. Notwithstanding Aets of Parliament, all the efforts of sanitary authorities, all the adviee that may have issued from this and other similar sources, serious defeets remain. Even your own great eity, aeeording to the journals, notwithstanding the splendid munieipal arrangements for whieh

it is remarkable, has still a higher death-rate than some other great cities. Since 1882 up to 1897 it has stood at from 21·6 to 20·2, and the same authority points out sanitary defects which one may venture to think might be ameliorated.

In the first week of July in thirty-three of the largest English towns the rate of mortality, which had been 15·1 and 14·9 per thousand in the two preceding weeks, declined to 14·7. It was 14·3 in London, whilst it averaged 14·9 in the thirty-two provincial towns. The lowest death-rates were 9·4 in Cardiff, 9·7 in Huddersfield, 10·3 in Brighton. The highest rates were 17·9 in Plymouth, 20·3 in Newcastle, 21·4 in Sunderland. When the last quinquennium is compared with the preceding decennium it is found that Blackburn and Huddersfield have reduced their death-rate 4, Halifax and Cardiff 3·8, Oldham 3·7, Preston 3·4, Manchester 3·3 per thousand, while Birmingham has been practically at a stand-still.* If I am not mistaken, your own eminent health officer thinks that if the death-rate is to be reduced, it is essential that the improvements should be continued which had such a good effect some years ago. I merely venture to suggest it as a hint that may be worthy of the consideration of the municipal authorities.

Apropos of London, Sir Henry Burdett said in a speech made last year: "London, unfortunately, in regard to certain health matters is still under the control of the Vestries. * * * In the district of ——— for example, in this year of the Diamond Jubilee (wherein the greatness and majesty of the British Empire has been so convincingly exhibited,) the streets of one of the wealthiest portions of London are left unswept and uncared for from Saturday to Monday in each week. No matter how high the temperature, or how filthy the streets may be, the streets of probably the wealthiest district in the Metropolis of the Empire are made dangerous to health. * * * * Some of the most influential of the residents have entreated and protested in vain. The intelligent foreigner, to his surprise and disgust, may see in the streets of ——— on any Sunday when the principal residents are at home all day, fermenting filth and even dead cats, dirty papers and various kinds of offal, which offend the senses and infect the atmosphere to the danger of the inhabitants. Such a state of affairs is as shameful as it is unaccountable."

He might have added a paragraph upon the abominable and insanitary practice of sending out the vestry dust-carts to take away the house refuse at all times of the day. This

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* "Lancet," July 16th, 1898.

proceeding is not only offensive to the eye and nose, but prejudicial to health. It ought to be promptly discontinued, and on no pretext ought dust-carts to be allowed in the streets after an early hour in the morning. Recent discussions in the House of Commons shew that the question of pure water supply also has not yet been satisfactorily settled or brought under the control of the sanitary authorities. It is to be hoped that disputes upon a question of such vital importance will not long remain unsettled.

Nevertheless, when we contrast the present state of our country with its 29 millions of inhabitants, with that of the Elizabethan era with its 4 millions, we have ample proof of the ignorance of science in those days and of the great improvements which have taken place in these. When we think of the ill-ventilated dwellings, the ill-built towns and villages, the narrow, unpaved, unlighted streets, uncultivated, marshy country, unreclaimed land, the wretched houses, often of wood or earth, without drainage or ventilation, with floors covered with straw or rushes saturated with filth and reeking with noxious miasmata, the stagnant gullies and open cesspools, to which must be added the wretched diet, often of salted meat, with little or no vegetable food, the intemperate habits, and frequently the most impure water, we can understand how under such conditions disease found a congenial nidus, and frequently assumed the epidemic proportions in which it proved so destructive to life, manifesting itself in the forms of the black death, sweating sickness, typhus, plague, eruptive fevers, small-pox, leprosy, scurvy, malarial fevers, and dysentery. Many of these have disappeared—never, we hope, to return—and others have been mitigated.

But can we feel confident that the immunity will continue? I am afraid not! Sudden invasions of cholera and other epidemics, and, as now, of plague in India, are warnings that our vigilance must never be relaxed. But the experience of our country under the greatly improved sanitary administration of the present time has shewn how much we may rely on preventive measures wisely enforced, especially when these are based on experience and enlightened observation, and not upon mere theories of causation.

A brief enquiry into the statistics of some well known diseases will show that they have become less severe in their incidence if not less frequent in their recurrence, and how far they are thus subject to the influence of hygienic measures.

In Small-pox, for example, there has been great reduction, more so than in any other disease. Since the passing of the first Vaccination Act in 1841, the death-rate has fallen from 576 per

million to 20 per million in 1891–95. Vaccination, isolation, attention to rational treatment, whether therapeutic or hygienic, have preceded or accompanied, and as most people believe, induced these results; and theories which ignore vaccination as a preventive must, it appears to me, necessarily be rejected until a better explanation of the cause of the diminished incidence and mortality from the disease can be offered.

As to the value of vaccination, all the evidence that is forthcoming seems to shew that there can be no doubt of it. As to the methods by which every individual is to be vaccinated or re-vaccinated, that is a subject for the State to determine. That the Acts in existence up to the present time are inadequate to this end is plainly shewn by the fact that large and increasing numbers of the population are known to be unvaccinated, despite their compulsory character. Lord Lister said in his speech in the House of Lords last August that one-third of the children born are unvaccinated, and that one-fourth of the Boards of Guardians do not put the law in force.

The most recent Vaccination Act, whatever may be its advantages, is certainly defective in this: that it makes no provision for re-vaccination, the necessity for which is universally admitted by the medical profession, whilst it is very doubtful whether the modification of the compulsory clauses will have the effect, as it is hoped, of extending vaccination. This remains to be seen during the five years for which the new Act is to be operative. Whatever the Government may have thought proper to enact, though there seems good reason to believe that as far as it is concerned faith in vaccination is unshaken, it must be borne in mind that the Royal College of Physicians have recently expressed their unaltered conviction, and it is endorsed by the whole profession, that vaccination "properly performed" and "duly repeated" is the only known preventive of small-pox, a view "which is confirmed by the experience of every epidemic, and is endorsed by those whose office it is to combat such outbreaks by all the resources of science. The characters of small-pox, its high degree of contagiousness, the rapidity of its spread on congenial soil, defy the efforts to suppress it by isolation alone or to arrest it in its earlier days of invasion, and if vaccination were not at hand to render its remarkable aid, the disease would become as common and as widespread in this country as it was in times when sanitary science was unknown." *

In 1838 the death-rate from fever at all ages was 1,053 per million; in 1891–95 it was 185 per million. It was not until

* "Lancet," August 6th, 1898.

1869 that enteric fever was separated from typhus, so that it is not possible to say how much of the reduction should be assigned to each, but the death-rate from enteric fever has been reduced by about 53 per cent. since the diseases have been differentiated, whilst typhus has almost ceased to exist. Now these fevers notably flourish where sanitation is defective, and as dirt, overcrowding and destitution have been diminished so has typhus disappeared, whilst with improved drainage, the removal of excretal filth, and the supply of pure water, enteric fever has become less.

There is reason to think that Cholera is similarly influenced, for though it has appeared in England several times since its first invasion in 1831, as in 1845–49, '53–54, '65–66, and even since as at Grimsby in 1893, yet its virulence and activity have been gradually diminishing. I believe we do not know all the conditions on which the origin and diffusion of cholera depend, but it has been shewn here, as in India, that whatever may be its ultimate cause it is amenable to sanitary laws; and that though we may not be able to prevent it altogether, we can so mitigate its incidence and severity as to deprive it of much of its terrors. Happily the antiquated system of prevention by coercion has in our country been replaced by that of sanitary measures and isolation, and it is to the wise and judicious exercise of these by the medical authorities of our Local Government Board and County Councils, and by Municipal authorities and Health Officers throughout the kingdom, that whilst neighbouring countries in the full practice of coercion and quarantine were decimated, England has lately remained almost exempt. It seems to me that few better examples of the benefit arising from vigorous action by Government, under the guidance of scientific authority, could be adduced.

Scarlet fever and diphtheria were formerly tabulated together; since 1859 they have been separately returned, and I learn from Dr. Louis Parkes (a most worthy successor of his distinguished relative and namesake) that "in 1838–42 the joint mortality was 797 per million living; in 1891–95 it was 435 per million, a reduction of 45 per cent. Since 1861–65 the scarlet fever death-rate has been reduced 81 per cent., but the diphtheria death-rate is now very much the same as it was over thirty years ago (1861–65), and about double the rate prevailing in the fifteen years 1866–80. Whilst there can be little doubt that improved sanitary and social conditions have played some part in the reduction of the scarlet fever death-rate, still the larger proportion of the diminished mortality is probably attributable to a change in the type of the disease."

With regard to diphtheria, it would seem "that sanitary

arrangements as such have had little or no effect upon the behaviour of the disease. The exciting cause is now known to be a bacillus, but we know little of the conditions—the predisposing causes—which favour the growth or virulence of this micro-organism, either inside or outside the human body, or which facilitate its transference from the sick to the healthy —conditions which must be studied if we are to ascertain why it is that diphtheria has made certain large centres of population its abiding place, and in its endemic homes assumes at times epidemic proportions. There is evidently some connection between elementary school attendance as now carried out and diphtheria prevalence, but the relation is not a very simple one, and is incapable of explaining all the facts of increased diphtheria incidence in rural populations."

Dr. Louis Parkes' remark suggests the necessity for studying all collateral conditions of other diseases as well as diphtheria, as being of equal importance with the microbe, which is believed to be the *causa causans*, and of more practical value as far as preventive measures are concerned.

In 1835–42 the death-rate from tubercular disease was 3,959 per million, in 1891–95 it was 2,124, not so remarkable a diminution as in other diseases; but it serves to shew that sanitation has done good by helping to improve the ill-ventilated crowded dwellings, damp, waterlogged soil, impure water, and protection against noxious trades. Better drainage and drying of the subsoil have been shown by Sir G. Buchanan in this country, and Dr. Bowditch in America, to have been attended by diminution in the death-rate from this cause.

Dr. James Pollock, in a recent Report on the Hospital Treatment of Consumption, makes the following pertinent remarks: "In seeking for the cause of this vast improvement in the health of the country, we must attribute it mainly to improved drainage of the subsoil, more cleanly habits, removal of insanitary surroundings, better dwellings, and a higher standard of comfort in the lower classes. Bacteriology is the study of the hour, but it is plain that the presence of bacilli alone is not sufficient to account for all the phenomena of tubercular affections, and we are perhaps in danger of substituting the work of the laboratory and the microscope for clinical observation. However this may be, we have witnessed an enormous decrease of deaths from phthisis, and a decided lengthening of its duration. Fewer die of it, and are slower to die when affected. As yet we know of no agents which we can apply locally to the interior of the body for the destruction of bacilli or septic material. The energies of medical men are to-day devoted to preventive medicine, and in this consists our hope that the more

fatal diseases of our time may be extinguished." It is satisfactory to know that an Association has already been formed which has for its object the Prevention of Consumption and other forms of Tuberculosis, and as this is supported by the heads of the medical profession and other influential authorities, it is to be hoped that effective war will be waged against what is now considered to be a preventible disease.

As to malarial diseases, we may include them, in England at least, among those that have become all but extinct. The improved state of land drainage, the reclamation of marshy and swampy ground and more extensive cultivation have almost, though not altogether, eradicated a prolific source of disease and death which, though much diminished even in the early part of this century, had in past times caused the loss of many lives and great deterioration of health.

This disease is still the prominent cause of death in our Eastern Empire, as will be shown later; but the results of improved sanitation and the extension of cultivation and subsoil drainage, under the direction of the admirably conducted sanitary department of the Government of India, are there too producing good results.

It is not to be supposed that zymotic disease can be altogether exterminated, but we can modify and diminish its incidence, and as our knowledge of the real causes and the concomitant conditions which foster its evolution extend, we may hope, at least, if not to extinguish, so to attenuate as to render it comparatively harmless, as, indeed, has been the case with more than one scourge of our race.

The scope and aim of Sanitary Science in its preventive aspects should not be limited to the consideration of zymotic and other acute diseases, but should extend to the results of abnormal social conditions arising out of the strain and struggle for existence, involving over-competition in various occupations by which life is supported, or wealth and distinction acquired, and under the pressure of which so many lose their health or even succumb. For example, it frequently suggests itself that the over-pressure now exerted on the younger of the rising generation may not only involve the risk of miscarriage of true education, but dangers against which it is as much the duty of preventive medicine to guard young people as it is to protect them from scarlatina, small-pox, measles, cholera, or any other disease.

Again, as regards the food of the people, how necessary it is to exercise control and supervision; and it is satisfactory to know that not only does science teach the recognition of improper food, but executive sanitary regulations endeavour to

protect them from the consumption of tuberculous or otherwise contaminated flesh or milk—which, unhappily, are far too common—oysters and shell-fish grown up under the influence of water polluted with sewage, etc., as effectively as it does or should do from impure water.

The influence exerted on vital statistics by sanitary science may be seen by reference to the returns of the Registrar-General.

In the birth-rate, however, we find a diminution, especially since 1871–80, when it fell 3 per thousand. It has fluctuated from time to time, but since 1876—when it was 36·3 per thousand, the highest recorded—it has steadily declined, and for the quinquennium 1891–95 was 30·5 per thousand. This must be due to a variety of social conditions, which need not be discussed here.

The great increase in the population is an indication of the increasing prosperity of the country. This, of course, is attributable to many causes apart from sanitation, though, no doubt, improved hygienic conditions have some share in it, as is shewn by the diminished death-rate. The census of 1841 returned the population of England and Wales as 16,049,554, that of 1891 as 29,002,525, and it is still progressing at a similar rate,* and not likely to be restricted whilst the present state of prosperity continues, and the Empire is ever enlarging its boundaries.

One indication of the effect of sanitary work is observed in the death-rate of the country. In 1841–50 it stood at 22·4 per thousand; in 1891–95 at 18·7 per thousand; but for the four years 1890–1893, it had risen owing to epidemic influenza, the lowest rate, 1884, having been 16·6 per thousand. It varies considerably according to locality. In some parts of England where health is the main object considered, it has been as low as 9 per thousand; in others where the chief objects are manufacture, trade, or money-making, it has been 30 per thousand. The death-rate is susceptible of considerable modification, and we know how it may be increased or diminished; it behoves the nation to exert its power and stand credited with the lowest figure. In fact, it is, within certain limits, at our own control, and whether the people shall die at the rate of 13 or 23 per thousand depends on how we recognise our responsibility and put in force sanitary regulations. It is mainly a question of finance. Our sanitarians can say how it is to be done and are perpetually saying it, but more money, more faith, more energy are needed to deal with this question satisfactorily.

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* In the Registrar-General's quarterly return for the second quarter of 1898 it estimated at 31,397,078.

The death-rate has fallen proportionately more in the towns than among the rural population. In 1861–70 the town death-rate was 24·8 per thousand whilst the country was 19·7, but in 1891–95 the town rate was 19·5 and the country 17·3—in both cases a diminution but more marked in the urban, probably because sanitation was better in the towns than in the country.

There is a leading article in the *Standard* of June 23rd stating that the death-rate for London, one of the healthiest cities in the world, for the previous week had been 13·8 per thousand, the lowest for five years with the exception of one week in July last year, when it was 13·5. This shows that improvement has taken place of late years, for in 1855 it was 24·3 per thousand, in 1887 it was 19·3, and two years later it was 17·3.

The tendency to migrate to towns no doubt helps to reduce the general health, and it would be well to discourage this as much as social and economic requirements will permit; for a strong and healthy peasantry is more conducive to the national welfare than a weakly urban population.

The registration system came into force the year of the Queen's accession under the auspices of Dr. Farr, and it is since then that we have been able to get accurate vital statistics, upon which depends our knowledge of the state of public health, and from which also we can estimate the mean expectation of life. Statistics show that in 1838 to 1854 the mean expectation of life was for males 39·81, for females 41·85 years. From 1871–80 it had increased to 41·35 for males, 44·66 for females. "When Dr. Farr commenced his labours the mean duration of life in Surrey was 45 years. It was not more than 37 years in the Metropolis and 26 years in Liverpool. Now, the mean duration of life throughout the whole of England and Wales is higher than the first named figures."* Dr. Tatham, in the Registrar-General's report for the last ten years, gives the mean expectation of life for males as 43·7, females 47·2 years. From a comparison of the tables of 1841 and 1881-90, it will be seen that this has increased both for males and females up to the age of 30, but diminished after that age.

Age.	1841.	1881—90.	1841.	1881—90.
20	39·88	40·27	40·81	42·44
30	33·13	32·52	34·25	34·76
40	26·56	25·42	27·72	27·60
50	20·02	18·52	21·07	20·56

* "Practitioner," June, 1897, p. 704.

shewing that though improved sanitation saves more children's lives, the conditions of life being harder as time progresses, the expectation of adult life has become rather less: for the very causes which enabled the weak and sickly to survive have perhaps in the end thus tended to diminish the value of the adult life of such survivors.

It has been suggested that whilst our improved sanitation, our amended condition of living, and our more extended charity have done all this good, and have generally bettered the human race, on the other hand they have prolonged the existence of those who formerly would have succumbed rather than promoted the survival of the fittest. To a certain extent it may be so, but the moral sense insists that the benefit of our knowledge must continue to be exerted in the direction of ameliorating the sufferings, and prolonging the life of the individual as well as of the race.

As to the registration of sickness, to quote Dr. Farr:—"It is true that notification of the chief infective diseases has been secured in the majority of districts; but the wider returns of all sickness treated at the public expense, whether in rate-supported or State-supported institutions, or in hospitals supported by charity, are still left almost completely un-utilised. As Farr said, 'the thing to aim at ultimately is a return of cases of sickness in the civil population as complete as is now procured for the army in England.' By means of such returns 'illusion will be dispelled, quackery as completely as astrology suppressed, a science of therapeutics created, suffering diminished, life shielded from many dangers. The national returns of cases and of causes of death will be an arsenal which the genius of English healers cannot fail to turn to account.'"*

I have already alluded to the benefits that have accrued to the vast population, over 280 millions, of our great Indian Empire, and I trust that a few remarks on the subject may not be considered inopportune. My former connection with India, and the experience derived from observation of its diseases and their effects, in addition to the interest that attaches to whatever concerns the health and well-being of our own as well as the indigenous races, will I trust be accepted as justification for introducing this into an address to a Congress that deals with public health as its chief topic of interest.

The beneficial results of sanitary work have nowhere been better illustrated during the last half-century than in India. Up to that time little or nothing had been done to control disease, or to organise measures upon which public health and

* "British Medical Journal," June 19th, 1897.

the preservation of life depend. The disastrous effects of the want of such precautionary measures on our Army in the Crimea led to the appointment of a Royal Commission to enquire into the sanitary condition of the British Army, and to devise measures for remedying such defects as might be revealed. And here I may say that the result of that Commission was that the mortality of the British Army has fallen from 16 or 18 to 6 or less per thousand. In 1859 this enquiry was extended to India; first to the European and subsequently to the Native Army and jail and civil population. The enquiry having to deal with a large body of men the conditions of whose lives were well known, a vast amount of reliable information was obtained; and it was ascertained as one result of the investigation that the ordinary death-rate of the British soldier had stood for a long period of time at the appalling figure of

84·6 per 1000 from 1800—1830
56·70 „ „ 1830—1856.

It resulted in certain sanitary changes and improvements in the housing, clothing, food, occupation and discipline of the soldiers, which were followed by a signal decline in the death-rate, though marked by fluctuations :—

1886	...	15·8 per 1000	1891	...	15·89 per 1000
1887	...	14·20 „	1892	...	17·07 „
1888	...	14·84 „	1893	...	12·61 „
1889	...	16·60 „	1894	...	16·07 „
1890	.	13·54 „	1895	...	15·26 „

It has been even lower, down to 10 per thousand. Epidemics such as fever, cholera, &c., disturb the regularity of the death-rate, but it is certain that on the whole there has been great reduction of this.

If we roughly estimate the value of a British soldier as £100, a simple calculation will show the amount of gain in the value of lives saved, to say nothing of the suffering and invaliding avoided.

I confine myself here to a simple reference to one form of preventible disease which has recently attracted much public notice, as it seriously menaced the efficiency of the army in India. Its rapid increase was attributed, erroneously, I believe, to the suppression of a Contagious Diseases Act which could only from the nature of things have been of very limited application in that country. But even granting that it may have been to a certain extent concerned, the main causes are to be sought far more probably in the absence of other preventive measures rather within the sphere of military discipline

As attention has been directed to this, as well as to other possible causes, it is to be hoped that the evil may be controlled.

The death-rate of the Native Army does not shew so great a diminution, but here too there is improvement.

In 1889	the death-rate	was	12·94	per thousand.
„ 1890	„	„	15·91	„
„ 1891	„	„	15·44	„
„ 1892	„	„	14·97	„
„ 1893	„	„	10·29	„
„ 1894	„	„	10·76	„
„ 1895	„	„	11·60	„

Another class about which we have reliable statistics is the jail population, and here the mortality is higher, despite sanitary measures. For example—

In 1889	it	was 36·56	per thousand.
„ 1890	„	31·49	„
„ 1891	„	31·89	„
„ 1892	„	36·83	„
„ 1893	„	25·01	„
„ 1894	„	31·87	„
„ 1895	„	27·61	„

The high rate of sickness and mortality in the Indian jails has been a subject of anxious consideration to the Government of India and the sanitary authorities. No pains—I may say no expense—are spared in dealing with it. The abnormal conditions of prison life, and perhaps occasional defects in architectural construction, may in some measure account for it, and the probability is that were not every sanitary precaution rigidly enforced the mortality would be higher than it is.

As regards the vast civil population we have not only got to deal with epidemics, famine and long established modes of living, which obstruct improvement, but also with ignorance, prejudice and religious scruples, which tend to make the natives doggedly resist all measures taken for the amelioration of their condition. They persist in their ancestral modes of social life, resist all changes, and, as we have lately seen, have risen in revolt against the well-meant measures devised by authority for saving them from plague, cholera, and other pestilence. Their indolent habits, prejudiced minds and fatalistic creed all stand in the way, but even the natives of India are being gradually educated into a better comprehension of the value of sanitary measures, and, as time progresses, it is to be hoped that under the firm and judicious administration of the authorities, sanitation may prove as beneficial to them as it has been to others. Though we know that improvement is in progress it is not so easy to shew

by statistics the actual rates of mortality of the vast civil population, because so many disturbing causes exist; and though registration is greatly improved there is not the accuracy and reliability that belong to the returns of the army and jail population, which are all under supervision and control.

Referring to the published mortality returns during the period between 1882 and 1895, they have oscillated between 23 and 33 per thousand. This is after all not a very high death-rate considering the circumstances, but is susceptible of diminution, and this I trust will take place.

Since 1866 a well-organised sanitary department has existed and every effort is made to give effect to its teaching, whilst the ample and carefully constructed reports by the Chief Commissioner, as well as those of subordinate local governments and municipalities, afford ample data upon which to construct preventive measures, and at the same time shew that public health forms one of the most important considerations of the Government.

The annual Report of the Sanitary Commissioner with the Government of India for 1892 shews that out of a registered population of 217,255,655, 4,621,583 died of fevers. Compare this with the year 1895, when out of a registered population of 226,010,428 (note the increase) there was a death-rate from fevers of 4,266,293. These returns fluctuate, but at any rate the figures shew a tendency towards improvement. How much more fatal, fever is than any other disease is shewn by the following figures for 1892:—

Fevers caused	4,621,583	deaths.
Cholera ,, ...	727,493	,,
Dysentery and diarrhœa caused	234,370	,,
Small-pox ,,	101,121	,,

The plague which has appeared in India within the last two years, and has so largely added to the death-rate in certain localities, its modes of invasion, diffusion, and recrudescence, are all being carefully studied, and already it has been shewn to be amenable to sanitary laws like other epidemics; we may, therefore, hope to ultimately control and get rid of it altogether, though there is reason to fear that this will not take place for some time to come.

It is satisfactory to know that the etiology of cholera, plague, and fevers is being carefully investigated by competent observers, and we are warranted in believing that we are approaching the solution of important problems of ultimate causation of disease which have hitherto remained without satisfactory explanation, and the knowledge of which will enable

us to construct our measures for prevention upon an even more assured basis than they occupy at present.

In connection with the subject of sanitation and preventive medicine in India, one may not omit to refer to the names of its great pioneers, such as Ainsley, who wrote as early as 1788 upon measures for the protection of the health of soldiers; Ranald Martin, who was one of the foremost pioneers in India as he was in this country, and to whose initiation many of the sanitary measures now in force in both countries are due; later on J. M. Cuningham, Bryden, Cornish, Hewlett, Ewart, D. Cunningham, Vandyke Carter, Simpson, Manson (China), whose investigations into the causation of malarial fevers have justly excited so much attention; and to these, did time permit, I might add a number of names of younger men to whose admirable work I gladly bear testimony.

I have already noticed the great progress that has been made of late years in the knowledge of the etiology of disease. This is not the time or place in which to describe or dilate on the various steps by which it has been or is being acquired; but one must not omit to acknowledge that its importance in relation to hygiene and as a scientific basis on which to found any rational system of proceeding with regard to prevention as well as cure of disease is incalculable, for without it, although empirical methods may be of some value, no real progress can be maintained.

It is impossible to exaggerate the value of these researches, which have already led to the antiseptic methods of preventing the noxious action of micro-organisms and their products, and to the knowledge of the immunising or curative effects produced by inoculation of the attenuated virus, toxins or antitoxins (blood serum therapeutics), as well as to the aid that has been afforded to diagnosis. Already, indeed, important practical results have been obtained.

I am indebted to Dr. A. Macfadyen, the able Director of the Institute of Preventive Medicine, himself one of the most distinguished workers in bacteriology, for the following lucid account of the progress already made in the application of bacteriological science to the prevention and treatment of disease, and which holds out promise of further advance in this most important branch of science. The successful establishment of the Bacteriological Department of the Institute as well as of that of the Royal Colleges, is an earnest of further development in our own country of a branch of scientific enquiry which is obviously of such vital importance to public health and to those interests with which this Congress is so closely concerned.

"There can be no better memorial to Jenner than to carry on his work in his spirit. The fresh impulse to this was derived from the labours of Pasteur and Koch, who not only demonstrated the part that living agents play in the causation of disease, but also gave us the methods whereby these might be investigated. In this way the foundations of bacteriology were laid.

The main problems connected with the causation and prevention of disease and many sanitary questions are bacteriological in their nature, whilst some of the most pressing questions connected with water and sewage are of a biological character. The soil, air, and water, as well as our food, have to be considered as possible media for harbouring and conveying the living germs of disease.

The question of questions has been that of immunity to disease. We know that animals are insusceptible to certain diseases that affect man, and that the converse holds good. We also know that certain individuals remain unaffected in times of epidemic, though equally exposed to the infection. Further, that recovery from certain diseases protects the individual against a subsequent attack of the same disease.

The attempt has been made to follow nature's methods in the hope of protecting the system from the attack of a disease or of alleviating its symptoms. The discovery of the principle of vaccination for small-pox remained a unique achievement until the successful isolation of the living agents in many infectious diseases rendered it possible to work with greater certainty of success in this field.

The attempt was made to use the modified living virus to produce a mild attack of a disease with a view of protecting the system against infection with the fully virulent virus, *e.g.*, Pasteur's attenuated anthrax vaccine for cattle.

The endeavour was also made to use as a vaccine, substances which no longer contained the living organisms, but their products. Bacterial toxins of varying origin have been experimented with for the purpose, *e.g.*, products obtained from the cultures or the bodies of pathogenic bacteria; as in the case of the cholera and typhoid fever organisms, and more recently the disintegrated bodies of tubercle bacilli.

The results are not yet of a final character, though much hopeful work is being done in connection with cholera asiatica, enteric fever and tuberculosis.

The greatest modern advance in the treatment of disease has been the introduction of serum therapeutics through Behring's labours, which have found their special application in connection with diphtheria and tetanus.

Diphtheria and tetanus may be described as toxic diseases, inasmuch as the general intoxication of the system due to the poisonous products of the diphtheria bacillus or the tetanus bacillus outweighs in gravity the local action of these organisms at the seat of infection. These bacilli when cultivated in suitable media produce the same toxins that they elaborate in the body, and it is these toxins which

are utilized for immunizing purposes. The animal used is usually the horse, which after treatment with progressively increasing doses of the toxin becomes ultimately insusceptible to otherwise fatal doses of these poisonous products. The animal is then said to be 'immune,' in virtue of antitoxic bodies produced in its system through the introduction of the toxins. The blood serum of the immunized animal contains the antitoxic bodies in large quantity, and can, when transferred to other susceptible animals, confer a like protection in virtue of the immunizing substances it contains. The method adopted is appropriately termed 'blood serum therapeutics.' This procedure is technically known as 'passive' immunity, *i.e.*, the animal has not to go through an attack of the specific disease in order to acquire protection.

The bodies that are produced in the course of immunizing a horse, say to diphtheria, are called antitoxins, because they act not so much on the specific microbe as on its products. In the course of an attack of such a disease the human body elaborates similar substances, which are in a certain sense antidotes. If formed in a sufficient quantity a neutralization of the toxins that are being formed by the microbe in the system occurs and recovery takes place. At the 'crisis' nature effects a process of self-immunization. In the older methods it was sought to produce immunity by inducing a mild attack of the disease. In the case of blood serum therapeutics, immunity is brought about by introducing into the system ready formed 'antitoxins' from a previously immunized animal, and the result, if successful, is an immediate one. The immunity is transient however, lasting only a few weeks.

The preparation of such antitoxic serums has only a prospect of success, when the poison to which the fatal effects of the illness are due is known, and can be obtained of an adequate strength for immunizing purposes. This has been the case in diphtheria, tetanus, and snake poisoning, and hence the most encouraging results that have been obtained are in connection with these complaints.

Experiment has shown that an antitoxin can act both as a preventive and curative agent. Thus, in the case of experimental tetanus, the serum from a previously immunized animal when injected into a guinea-pig is not only able to prevent the disease but also to cure it, even when tetanus symptoms have supervened.

It is in connection with diphtheria that the most successful results have been obtained in man. The Imperial Board of Health, Berlin, has published statistics in relation to diphtheria, which deal with 9,581 cases treated in hospitals with diphtheria serum from April, 1895, to March, 1896, and shew that for every 16 cases that recovered 3 died. In previous years before the serum was used there were on an average 6 deaths for every 16 recoveries. The mortality was accordingly reduced by one half.

The diphtheria serum has also preventive properties, and can be used for immunizing healthy persons exposed to infection.

In the case of tetanus in man the results have hitherto not been so satisfactory. This may be due to the fact that the serum has

not been of sufficient antitoxic strength, or because the disease was too far advanced previous to its employment.

In all cases the best results are obtained by the earliest possible use of the antitoxic serum.

The facts that seem proved are, that in human diseases characterised by an intoxication of the system, immunity occurs at the moment of recovery, and that by the artificial introduction of the substances to which this immunity is due it is possible to prevent or cure such infections.

If this be so the present endeavours of bacteriologists are based on Nature's methods, and we can confidently look forward to still greater achievements in the field of serum therapeutics.

Bacteriology has also supplied agents which are of proved value in the diagnosis of certain diseases. Thus *Mallein*, a preparation from the glanders bacillus, is successfully used for the early diagnosis of this disease. *Tuberculin*, a similar preparation from the tubercle bacillus, allows of an early diagnosis of the disease in cattle. An early diagnosis enables one to adopt timely preventive measures, and therein is the great value of tuberculin, inasmuch as we are here dealing with a communicable disease between man and animals.

Bacteriology has also rendered valuable help in the diagnosis of diphtheria and typhoid fever, and medical men and sanitary authorities are now largely availing themselves of this help.

The yearly increase in the work the British Institute of Preventive Medicine is asked to undertake on behalf of sanitary authorities demonstrates how keenly alive they are becoming to the importance of adopting the latest methods calculated to safeguard the health of the community."

Evidently, a great future is before preventive medicine, and we may confidently look to the eminent men of science who are now pursuing with such indefatigable zeal their researches into the mysteries of bacteriology for its fulfilment. But those who admire and appreciate their work the most, and look forward hopefully to its results are anxious that progress should not be retarded by hasty deduction and premature generalisation, which may only end in disappointment.

I venture to suggest that however great may be the importance of the study of bacteriology and the various conclusions resulting from it with regard to the origin, diffusion, and prevention of disease, there are other factors of no less importance to be considered, and it can only be by the study of all these that we can hope to arrive at the complete knowledge which will enable us to fulfil the requirements of sanitary science. Whilst on the one hand it is of the utmost significance that we should be able to demonstrate the actual cause, whether a micro-organism or not, on the other hand it is not of less—nay, from a practical sanitary point of view it is of

more—importance that we should know all the conditions under which this cause becomes effective. It is not enough that we know the seed, but it is necessary that we should also know the nature of the soil, the meteorological and other conditions which determine whether it is to grow and multiply or to remain inert and harmless. If one can learn how to destroy the seed or sterilize the soil in which it attains its full development, or if we can neutralise the favouring conditions and so prevent or impede its growth, then we shall have solved a great problem, and conferred a lasting benefit on mankind.

Much of this has already been done, and the splendid work of Pasteur, Davaine, Koch, Lister, B. Saunderson, Sims Woodhead, and their followers, has added and is almost daily adding to the knowledge which confirms the hope that the consummation so devoutly to be desired will be achieved, that zymotic disease will be minimised, that life will be prolonged nearer to the natural term of human existence, and that man, in short, will no longer be subject to the curse of dying before he has reached the prime of life.

It cannot be doubted that The Sanitary Institute has already done excellent work, and has contributed its share to the advance which public health has made since its foundation. The Spirit of Hygeia is abroad, and measures for preserving health and preventing disease, which at no very distant period in the past were looked on as mere hypotheses, are now, thanks to the teaching of this Institute and others of a similar character, and notwithstanding the obstacles to research arising out of ill-considered sentimental opposition, regarded as of vital importance, and an integral part of the basis of the system of administration on which the public health depends.

I cannot conclude this address without expressing a hope that the proceedings of this Congress now assembled may add largely to the influence of the work of The Sanitary Institute, and widely diffuse the opinions and teaching of the numerous men of science who are associated here and elsewhere in the crusade against insanitation, and in the great humanitarian project of furthering not only the health, but the moral and material welfare of our own country and of all the world.

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Leamington College Prize Distribution.

SPEECH BY SIR JOSEPH FAYRER.

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Sir Joseph Fayrer said: Having completed the most interesting and important part of the duty confided to me, that of distributing the prizes, I will now, with your permission, make a few remarks which seem to me appropriate to the occasion which has brought us together to-day, I desire to thank the governing body for the distinction conferred on me by inviting me to preside over this meeting, to assure them that it has given me great pleasure to do so, and that it is a source of sincere gratification to offer my hearty congratulations on the marked progress and success of the School, results which, it is well known, are due not only to the judicious administration of the governing body, but also to the earnest, zealous, and able tuition and management of the Head Master and his colleagues. No one can have watched the progress of the College for the last few years, during which it has made such rapid strides, without feeling a deep sense of obligation to them for their admirable work, which has not only re-established the ancient prestige of the School, but justifies the feeling of confidence with which its future is anticipated. This must be a subject of gratification not only to Leamington and to the parents of the boys who are educated in the College, but to all who are interested—and who is not?—in the welfare of that most important of our national institutions, a public school. We have heard with great interest and satisfaction the report of the Head Master, and the results of the Oxford and Cambridge Examination, which prove that the boys have attained not only a high standard of knowledge, but that they have been well taught, and that the moral and intellectual training has been of a high order. The curriculum, moreover, shews that education in the truest sense is the object aimed at, rather than the accumulation of facts which, however useful they may be in other ways, are of little value as a means of general culture, of disciplining the mind, of preparing it for higher objects, or of making that most desirable of all things, a gentleman, and of fitting the young for the emergencies of life, and, above all, of teaching them how to learn. I, for one, confess that in these days of competition, when subjects are apt to be selected and taught rather with reference to their commercial value than their fitness as a means of mental discipline, I sympathise with those who steadily oppose and resist the growing tendency to disregard or depreciate the tried and approved system of education which is well known to have been so effectual and successful in times past in our public schools. Such, I am glad to see, is the spirit of this school, and such I trust it may continue to be. No one, I hope, will for a moment think that I undervalue the teaching of Natural Science and other kindred subjects. On the contrary I value it highly, in its right place, but I would postpone it until the boy's mental culture has been so far advanced by other well-known and accepted means, such as Classics and Mathematics, as to fit him to assimilate and make proper use of them and other technical branches of knowledge. Let me now say a few words to the younger portion of my audience—a very few, but, as I think, important words—which I trust they will lay to heart and ponder over, not only now or when their thoughts revert to their schooldays, but always, as they make their way in life, whatever conditions that life may assume. I especially congratulate those to whom I have had the pleasure of handing prizes. I sympathise with the feelings naturally aroused by success, but I trust that these will not beget over-confidence or an undue sense of superiority, or involve relaxation of effort, but rather prove an incentive to further exertion. A clever writer has quite recently said, "strength is shewn by self-suppression rather than by self-glorification," and let me add that the winning of prizes, though most commendable, is not an infallible proof of possession of the qualities which lead to success in after life. You all know the fable of the hare and the tortoise, and can appreciate the moral! I do not in the least undervalue the efforts of those who have distinguished themselves; on the contrary, I applaud them, and regard the winning of a prize in open competition as a subject for legitimate pride. But I would remind you, in the words of the writer already referred to, "that the man who tries and succeeds is one degree less of a hero than the man who fails and yet goes on trying"—words of consolation and encouragement for those who, though doing their best, have for the present failed to win prizes. The unsuccessful competitors have no reason to be discouraged. The prizes missed this year may be won the next, and failure may do good by inciting to increased effort and to the recognition and correction of defects which are remediable by introspection and self-discipline. The main object of your life here is education. This does not mean cramming or the winning of prizes, but that training which cultivates alike mind and body, and fits you for the duties and responsibilities of life. And this, though applicable generally, is so specially in the formation of the attributes, character and qualification which make an English gentleman, a title which I trust you all not only claim now, but will maintain and do justice to in the future. Lord Salisbury recently made the following remarks when doing honour to the achievements of one who has greatly distinguished himself—"The Egyptian Army," said the Prime Minister, "as it has issued from the hands of Sir Evelyn Wood, Sir Francis Grenfell and the Sirdar, is a magnificent specimen of the creative power of the English leader. We do not reflect on it,

yet, if we have any insight into the administrative processes that go on in various parts of the Empire, we cannot help being impressed by the fact that numbers of educated young men, who, at home in this country would probably attract no special attention and who would show no very conspicuous qualities, except those we are accustomed to look for in an English gentleman, yet if thrown upon their own resources and bidden to govern and control and guide large bodies of men of another race have never, or hardly ever fallen short of the task that has been given them, but will make of that very unpromising material splendid regiments by which the Empire of England is extended and sustained." The officer here referred to is the distinguished victor of Omdurman, but there have been hundreds of similar examples, and it is from the public schools that these have generally emerged, and will continue to emerge while the methods of education which have been hitherto so successful shall remain in force. What has been done by one educated young Englishman can be done by others, and who can say what embryo statesman, general, lawyer, divine, or man of science I may now be addressing. The object of your life here, then, is not the accumulation of a number of details of this or that branch of knowledge, but that culture of all your faculties which may fit you to respond to any call that may be made on you. By all means cultivate any taste you may have for science, art, or music, but let your primary object be those subjects—your masters here will tell you what they are—that shall best develop your intellectual, moral, and religious life and character. As to your physical training that, too, is of great moment, and should go side by side with, but second in importance to the other. "Mens sana in corpore sano" can only thus be assured. When the Duke of Wellington said that Waterloo had been won in the playing fields of Eton, I cannot believe that he meant to ignore the share taken by the school room, but rather that, important as the latter might be, it was made more effective by the former. The character of the young Englishman is greatly influenced for good by the national athletic games, and they should be freely pursued, but not to the postponement of intellectual culture, and it would seem from occasional public correspondence that there is some danger of this, as there is a tendency to give more heed in these days to physical than to mental training. Avoid this mistake. Stick to your games, but let them, as they will if rightly followed, be ancillary, not prejudicial, to your school work indoors. But, whatever your objects in life, your tastes and pursuits may be, let me advise you, in your aspirations for the future, to contemplate and aim at a high ideal and work for it with all your energies and ability. Though you may not attain all you aspire to, you will surely maintain the national prestige, play a useful and honourable part in life, and so doing prove a credit to yourself, to your country, and to the Alma Mater that has nourished you.

FALMOUTH GRAMMAR SCHOOL
Distribution of prizes

Speech by Sir Joseph Fayrer

Sir Joseph Fayrer having distributed the awards, remarked that the school commenced its career in 1824 under the designation of the Classical and Mathematical School. It was evident that its Founders, including Lords Wodehouse and Dunsterville, and other gentlemen of position and importance, especially those connected with the Fox family, to whom Falmouth owed other debts of gratitude, contemplated a school where boys should receive culture and training and a liberal and religious education. In 1894 the present Head Master assumed control of the school, and the number of boys rapidly rose from 23 to 60. At present the number was 65. The trustees, knowing the advantages of the climate, were impressed with the idea that the school was well adapted for the training of delicate lads, and he was much inclined to agree with them. He was, however, of opinion that its advantages would be equally beneficial to the youth generally of a county which had often been regarded as the

birthplace of athletes, whether of physical or intellectual type. - The result of the recent examination shewed that steady progress had been made, and that the pupils had acquitted themselves most creditably. He assured them of the pleasure it afforded him to be present on that occasion. He was also glad of having an opportunity of saying how much interest he took in their charming winter health resort, which, from the mildness and equability of its climate, seemed so well adapted for the site of a school where young persons of doubtful or delicate constitution might, along with the robust, reside and pursue their studies under favourable climatic conditions during the winter months.

He thought the inhabitants of Falmouth and Cornwall generally were fortunate in possessing a public school with such advantages. All who had watched its recent progress must be gratified at the rapid onward strides it had taken. The plan of education adapted was based on sound principles and tended to develop intellectual growth and culture. The disposition to specialise at an early age was not encouraged

The main object aimed at was education in its truest sense, not a mere accumulation of facts, which, however useful in other respects, were valueless as a means of mental culture and discipline. He did not undervalue the study of physical or natural science, but regarded it as of supreme importance in its proper place when mental culture had been so far advanced by other well-known and tried means. Experience proved that early mental culture was of the greatest importance. He congratulated the boys who had won the prizes, and fully sympathised with the pleasure naturally resulting from the success. If, however, it excited any undue feeling of superiority, and suggested the notion that they might relax their efforts, it would have been better if they had not won the prizes at all. On the other hand, they should not undervalue the efforts of those who had distinguished themselves, but applaud them for the winning of a prize in open competition, which was a legitimate object for pride and congratulation. The object of their life was education, which did not mean ~~the~~ cramming for the winning of prizes, but the training which cultivated

Falmouth High School.

SIR JOSEPH FAYRER ON EDUCATION.

PRIZE DISTRIBUTION.

Sir Joseph Fayrer, who received a cordial welcome, said:—It has given Lady Fayrer and myself much pleasure to be present on this occasion, and to assist at the interesting ceremony, which, whilst it marks the conclusion of a year's work, commemorates the progress made in this school during that period. It has also afforded us an opportunity of becoming acquainted with the methods of teaching, and also of estimating by the results the satisfactory character of the administration of the school. It is very gratifying to hear so encouraging a report of its success, to know that the school is steadily increasing in public confidence, and that within the last three or four years its numbers have nearly doubled.—(Applause.) This is a subject for congratulation, not only to the teachers and the taught, but to the community of Falmouth generally, and especially to the parents and friends, who must naturally feel a deep sense of obligation to the accomplished lady and her colleagues, whose earnest, increasing, and skilful labours have contributed so largely to develop its present high state of efficiency to infuse confidence into all who are interested in its welfare and to justify the anticipation of still further success. I observe that, notwithstanding its comparatively recent establishment, the school has given marked evidence of its capabilities. Students are prepared for the Cambridge local examinations, and some have already passed the higher local with honours. Till now, outside examiners have not examined except in drawing, when the results were most creditable; but it is to be hoped that as the school continues to prosper, and as time goes on, similar tests will be applied in other subjects with equally satisfactory results.—(Hear, hear.) Respecting what may be anticipated from the teaching here as regards higher education, it is interesting to note that one student has already gone on to Newnham, and others to training colleges. The school is still in its infancy, but this is sufficient to show that it promises, under favouring auspices such as those now existing, to develop a vigorous maturity. Indeed, in all respects, I think it may be regarded most hopefully, for whilst it is well equipped in all that should ensure success in moral and intellectual training to possess remarkable advantages in its healthy and picturesque position and surroundings, well planned architectural and sanitary arrangements and mild and singularly equable climate, which seems to render it specially well-suited for children or young persons who, from one or other cause of delicacy or weakness, may dread and seek to avoid the rigour of the usual winter of other parts of our island. The curriculum shows that education in its truest sense is aimed at rather than the accumulation of specific facts in various departments of knowledge, which, however useful they may be in themselves, are of little value as means of disciplining the mind, or of giving general culture and preparing the recipient for the duties and emergencies of life. The training indeed contemplates not only the cultivation of the mental faculties and the higher education which in these days is rightly conceived to be necessary to put the girls to perform the duties incidental to any of the walks of life which are now open to women and in which the sexes alike are concerned, but also those more homely and domestic subjects, such

as needlework and cookery and the various accomplishments, as music and drawing, which give charm and interest to life and social existence.—(Applause). Let me now say a few words to the junior portion of my audience, who indeed are chiefly concerned in the proceedings of this afternoon. Lady Fayrer bids me to say to you how heartily she congratulates you on the result of your last year's work and on the prizes which several of you have won.—(Applause.) To those who have not been successful in prize-winning I would say, do not be in the least discouraged, renew your efforts; you may and probably will win next time, and the want of success on this occasion may do good by inciting to renewed efforts, to self-examination and the recognition and correction of defects which may have stood in your way. I hope it is not necessary to remind you who have won prizes that they should not render you over confident, or impress you with an undue notion of superiority, or induce any relaxation in efforts to advance; but rather, on the other hand, to act as incentives to continued exertion. Do not suppose for a moment that I undervalue your efforts. On the contrary, I entirely sympathise with and approve of them, and regard the winner of a prize in open competition as a subject for legitimate pride and congratulation. But remember the growth and development of your intellectual, moral, and religious life is far more important than the anxious struggle to be first. The chief aim of education is not simply winning prizes or gaining a high place in one or other special subject, but the cultivation of all the faculties that make for a high moral and intellectual standard. This can only be attained by striving to do your best always and in all things, not only in your work here at school, but at home, and in time to come, when you have to enter on the duties of later life, whatever conditions that life may assume. In any case let the ideal you aim at be a high one; keep your thoughts steadily on that object, and though you may not attain all to which you may aspire, you will in so doing surely fulfil the purpose which should be the aim of all English women of refinement and culture.—(Applause.)

On the motion of the chairman, Sir Joseph Fayrer, and Lady Fayrer were thanked, and in reply Sir Joseph congratulated the pupils on their performance, which reflected the highest credit alike on students and teachers. During the afternoon Lady Fayrer and Miss Todd were the recipients of choice bouquets from the teachers and students.

Lakes Falmouth Packet
Feb. 18. 1899

The following appreciation of Dr. Macnamara is from the pen of his old friend and colleague, Sir Joseph Fayrer :—

"In THE LANCET of March 11th I read with great regret a short paragraph announcing the death of Dr. F. N. Macnamara of the Bengal Medical Service. I little thought when quite recently I stood by his side at the grave of our mutual friend and colleague, Samuel Bowen Partridge, that we should so soon have to deplore the loss of this eminent medical officer, one whose whole life claimed the admiration of his numerous friends and brother officers and who through a long and distinguished career had rendered services of the greatest importance to the country and people in and among whom his useful life had for so many years been spent. The value of these services, though as unostentatiously as earnestly rendered, was thoroughly appreciated though they never that I am aware of received the public recognition they merited, yet they will long be gratefully remembered by the students and Dr. Macnamara's colleagues in the Medical College of Calcutta of which he was so brilliant an ornament, as by all to whom his noble personal character and courteous bearing endeared him. These services, of the greatest scientific importance, were not limited to India, for on his retirement some years ago he was appointed a member of a committee to inquire into and regulate the supply of drugs and medical stores to India and as a result of that inquiry he was appointed by the Secretary of State to supervise the administration of a new department which has worked most satisfactorily and beneficially both to the Government and India and well merits recognition of its importance and value. As an old friend and colleague as well as an admirer of his valuable services I desire to pay this brief tribute to his memory."

Lancet March 18th 1899

Speech at the Adult school at Falmouth March 27 1899

It was with much pleasure that I accepted an invitaion to preside at this meeting of the Adult School, for being much interested in all that concerns the welfare of Falmouth, I am naturally so in matters relating to education here.

My good friends and boatmen, William Hodge and George Sheaff, to whom I am indebted for much good service and interesting information of a local and technical nature, and whose sterling qualities entitle them to general confidence and respect, made me acquainted with the existence of this excellent school in which I am glad to know that George Sheaff, who has been decorated for his gallantry in saving life at sea, holds a post of trust. He it was who suggested that I should visit the school and see for myself what it is doing.

To this I had great pleasure in assenting, and being favoured by an invitation from Mr. G.H. Fox to preside at this meeting, I was glad thus to have an opportunity of shewing my appreciation of the Institution and of the honour conferred on me. I can well imagine that its prosperity is assured when it is under the aegis of so earnest and so true a

friend to Falmouth, especially when he is supported by such colleagues and benefactors as Mr.Rogers Mr Downing and other influential friends. A visit to the school entirely confirmed the high opinion I had been led to form of it.

I learn from your excellent secretary, Mr. Downing, that the school, established in 1884, has now 115 Members with an average attendance of 50. - I wish the latter figure were a little larger! At a meeting held last November, the Chairman in an interesting speech, stated that in addition to the above, everything possible was done to make the meeting pleasant on Sundays as well as on weekdays, that the social meetings on Tuesdays were well attended and that the library was a great help, especially to the young men who were never too old to learn, and that the reading of good books kept alive in them the grand thoughts of great men. He alluded also to a sick benefit fund, a Savings bank and other advantages which are of much value to the Institution. Encouraging remarks were made by other influential members, giving a very satisfactory account of the state of the school.

Mr Downing has been so kind, moreover,as to explain to me the nature, plan and objects of the

school, as well as the programme of work and the methods adopted for extending its utility and for fulfilling its purpose, which appears to be that of improving the general and religious education, and imparting such knowledge as may be useful in various ways, especially to those who may have been debarred by circumstances from availing themselves in early life of an ordinary education; and it is satisfactory to learn that this is appreciated and taken advantage of, though one would be glad to know that the number of those who avail themselves of that privilege were increasing.

Such an Institution conducted on sound principles and carried on under such favourable auspices must confer an inestimable boon on many, and there is reason to believe that these measures, here and elsewhere, for enabling those who have lacked opportunity of education in early life, of making up for lost time, are valued and utilised, and are gradually telling on the social condition and life of the people, and it is pleasant to have reason to believe that it is so, for in the competition which now obtains everywhere our nation cannot afford to fall behind others.

Nothing is more remarkable in the present age that the progress made in the general education, or more calculated to increase the happiness and prosperity of the nation. Among other subjects for congratulation offered to our beloved Queen on the completion of the 60th year of her auspicious reign, few could have been more gratifying than the general spread of education among her people, which is such as to give stability to her rule, and increase the happiness and prosperity of her subjects; and let it be remembered that the general diffusion of knowledge not only tends to advance the moral and intellectual status, but that it is improving the physical health and the value and duration of life of the popualtion, by teaching the importance of observing those rules of living on which physical, and consequently, moral health depend.

The Rev. J. Hocking remarks "Three-fourths of the sickness and ailments and weaknesses of the world are wastes and burdens - to the sufferers and to society, that need not be." I myself said some years ago, and the words hold good now, "If the people could be taught to believe in the efficacy of pure air, pure water, cleanly dwellings

temperate habits, proper food and clothing, and could be induced to make efforts to secure them; and if they could be taught to regard infective diseases as the scourge of uncleanliness and of their own disregard of the simple laws of health . . . the result would be, not only greater usefulness and happiness but better health and the saving of money. Preventable diseases, the result of insanitary conditions, still kill 140,000 yearly; and, considering the large number of cases of illness for each death, it has been calculated that 78 million five hundred thousand days of labour are lost in this country annually, which represents a loss in money of seven millions seven hundred and seventy-five thousand pounds per year."

Let me congratulate you on having such a school and urge you - especially the young men of defective education - strongly, to avail yourselves of the advantages it holds out. You may not now appreciate, perhaps, its value, but depend on it, you will do sooner or later. Think of what it might have done for many who never had such opportunities, and yet did well by their own efforts. I can remember well when they hardly existed.

How much has been done and can be done

life was with writing and with books, but men the busi-
business of whose life was with tools and machinery."
He then goes on to illustrate this by describing some
of the prize-winners. "There is a piecer at mule-
frames, who could not read at 18, who is now arith-
metic teacher in the Institution in which he himself
was taught, who writes of himself that he made the re-
solution never to take up a subject without keeping
to it, and who has kept to it with such an astound-
ing will that he is now well versed in Euclid and
Algebra, and is the best French scholar at Stock-
port." Among the delegates from the local socie-
ties there was a man "who worked when he was a mere
baby at a hand-loom; who began to teach himself
as soon as he could earn 5s a week; who is now a
botanist acquainted with every production of the Lan-
cashire valley; who is a Naturalist, and has made
and preserved a collection of the eggs of British
birds and stuffed the birds; who is also a concholo-
gist, and with a very curious and in some respects
an original collection of fresh-water shells, and
has also preserved and collected the mosses of fresh
water and the sea; who is worthily the President of
his own local Literary Institution, and who was at
work this time last night as foreman in a mill."

With this great writer I am sure you will all agree, and you will feel what gratification it would afford him and others of his way of thinking had they had the opportunity of witnessing such Institutions as this, Institutions which are the outcome of the necessities of the age and the demand for knowledge that is inherent in the people. You will see the bearing of it upon yourselves; it emphasizes the principle that success will depend rather upon your own personal exertions than upon your environment, though these personal exertions, when aided by such means as are now placed at the disposal of the student, must render the accomplishment of his purpose more certain and complete, whilst at the same time it will be satisfactory to feel that its benefits are not limited to any one class, but that it extends to all who are ready and willing to receive them. Accept your great advantages thankfully and avail yourselves of them fully. So train yourselves that you may inspire all with whom you come in contact with confidence in your capability and respect for such Institutions as this.

I think I ought not to detain you longer fro from your entertainment. It only remains for me to wish you much success in your future studies and in

the walk of life to which they may lead you, and to hope that you will in the future look back with gratitude to the school which helped to equip you with means of maintaining - I trust with success - the struggle for existence which is daily becoming harder in this great ever-increasing population, whether at home or in our colonies, to whose development it may fall to the lot of some of you to contribute.

I must now conclude these brief remarks by reminding you - and you can never be told it too emphatically or too often - that whatever else you may learn, you should remember the words of the Patriarch of Uz, "Behold the fear of the Lord that is wisdom, and to depart from evil is understanding."

CASTLE-DOUGLAS
COTTAGE HOSPITAL.

THE OPENING CEREMONY.

SPEECH BY SIR JOSEPH FAYRER.

Sir Joseph Fayrer, who was accorded a very hearty reception, said it gave him great pleasure to be permitted to take part in the proceedings of that meeting, and assist on that interesting occasion of the inauguration of an institution which was calculated to be of so much benefit to the people of this district. (Applause.) He had to congratulate the founders and supporters of the Cottage Hospital—especially Mr Graham Hutchison—on the success which had, so far, attended their philanthropic efforts, and most cordially wished them a continuance of it in the future. It was a most significant step in the social development of this neighbourhood, one which demanded and deserved alike admiration, approval, and support, for it must have beneficial results of the most important character to the community of the neighbourhood, whilst the relief it would certainly afford to suffering humanity would amply recompense its originators for the labour and expenditure it had entailed. Hospitals, whether large or small, now so numerous in our islands, were standing proofs of the vitality of that spirit of philanthropy which was the basis on which Christianity itself was founded. That this spirit permeated society generally was shown by the progressive increase of such institutions as this. To trace the early history of hospitals they would have to revert to Egypt 4000 years ago, later to Greece, Rome, and so downwards to the crusades and through the middle ages, when they found them closely associated with religious institutions; but this would be impossible on the present occasion. If they took up the thread of their history about the period of the Reformation it would bring them to the time when hospitals began to exist as separate from, and independent of, though quite in sympathy with, the Church, and it was then they would find the great endowed hospitals beginning to perform their important services to suffering humanity. But it was not till a much later period that they saw the institution of the greater number of the existing hospitals in Great Britain, which, whether as receptacles of the sick, or as medical schools, had played a part of ever increasing national importance. It was within the Victoriau age that they had attained their present great development, and had become the seat of scientific medical education in connection with their colleges and universities, as well as of the treatment of a vast amount of disease, thus conferring benefit on all, by educating the physician, curing the sick. It was characteristic of the public spirit and independence of our nation that, with the exception of the endowed hospitals, such as St. Bartholomew's, St. Thomas's, and Guy's, the great naval and military hospitals, and those in which epidemic infectious disease was treated—which were somewhat like the Lazar houses of earlier days—and which were supported by local rates, that the vast mass of hospitals and dispensaries were due to private charity, owing uothiug for their maintenance to State aid or interference. In this they differed from other nations. Now, it was withiu this period also that cottage hospitals had arisen, and since the inauguration of the first their utility had been more and more recognised, till they had now come to be regarded as indispensable institutions, proving themselves to be unmitigated blessings wherever they existed. He could hardly conceive of any form of charity more deserving of the sympathy and support of the community among which it was placed than a cottage hospital; disease and pain, the sole conditions of its ministry, it was disquieted by no misgivings concerning the justice or honesty of its clients' cause, but dispensed its peculiar benefits, without stint or scruple, to men of every country, and party, and rank, if needs be, and religion, and to men of no religion at all. And, like the quality of mercy, it is twice blessed, for 'it blesseth him that gives, and him that takes.' They might question the expediency of giving to some of the objects—good enough in themselves—submitted to them as worthy of support, but he thought he was not wrong in saying that no misgiving need either stint or limit their generosity here. Let them hope that the patriotic and philanthropic spirit which had so often expressed itself in acts of public charity in the Stewartry, would dispose the well-to-do to give of their abundance towards the permanent endowment of an institution which beyond question would merit their support. (Applause.) The first cottage hospital was established by Mr Napper, surgeon, at Cranleigh, in 1855. It began iu a cottage adapted for the purpose, had 6 beds, and each patient paid 3s 6d to 5s weekly. After a beginning was once made, the movement became general, and a further stimulus was given it by the Queen's Jubilee, until in the year 1892 there were 215 in England, 15 in Scotland, 14 in Wales, and 3 in Ireland. He could not say how many had been founded since, but he knew there had been seven, and he knew there had been one added that day. Apparently none had less than 4 beds, while some had as many as 42, in which case the term cottage hospital seemed to lose its significance. (Laughter.) Most cottage hospitals were for severe surgical and medical cases, though there were a few for iufectious diseases, and a few were special and for children, but children might well be admitted to all. As to finance, Mr Vacher, an English surgeon, in a paper read at the Chicago Congress in 1893, said that whilst most were dependent on voluntary contributions or endowments, a few were wholly or in part supported by local rates, and nearly all charged for the maintenance of the patients, generally from 2s 6d to 10s weekly. It was well, he said, that half the income should be derived from local subscriptions, in order to keep up interest in the hospital, and a well-managed one should get about two-thirds of its income from this source: church collections, and the like might be looked to to supply about one-third of the remainder, leaving the balance to be obtained otherwise, by patients' fees, or by interest from capital. It had been found that cottage hospitals, large or small, could be maintained at a cost of £46 per bed provided. or £66 per bed occupied. He merely mentioned this as an indication of what they cost elsewhere; it might be a guide to them here. Whether the hospital was an adapted building or a new one, there were necessary conditions to be provided for. The site should be in a raised, well-drained locality; there should be a free and full supply of pure water, fresh air, and sunlight. The wards should have a surface space of not less than 90 square feet for each patient, and a minimum cubic space of 800 feet (which should be doubled for infectious cases when admitted), with a free ingress aud egress of air. A certain part of the buildings of every hospital should be devoted to administrative purposes; in addition to the wards there should be a reception room, bath room, operating room, dispensary, matron's sitting-room, two bedrooms, a mortuary outside the building, kitchen, store room, and proper conveniences detached from, though connected with, the main buildings, whilst no drains should pass under the house. It might not be possible to obtain all this at once, but such was the ideal which should be aimed at as means permitted, and this they had here, for this hospital had the advantage of having been constructed on modern principles for the purposes for which it was intended, and the arrauge-ments about administration, patients' nursiug, and medical attendance, seemed to be all that could be desired. (Applause.) It was to be hoped, as time advauced, that means would in-

crease, that those who contributed now would continue to do so, that others might follow their example, and contribute towards its endowment, as they believed indeed they would, for everyone must feel that he had a personal interest in such an institution, and thus enable them not only to obviate the possibility of failure, but to enlarge their sphere of operations. It was very satisfactory to know that they were making such a good start, that the hospital could be extended, and that the basis upon which their future action was to proceed was of so sound a nature. (Applause.) He thought it would be their wish that he should here publicly express their acknowledgments to Mr Graham Hutchison for the important part that he had taken in the foundation and completion of the hospital. No one could read its history without feeling that to his influence, liberality, and unwearying labours, the initiation and success of this most public-spirited and excellent design was mainly due. (Applause.) It remained only for him to express the hope that this cottage hospital, which commenced its operations that day under such favourable auspices, would, like its congeners elsewhere, prove as great a boon and blessing to the population as they had done, that it would fulfill the purpose for which it was instituted, viz., the commemoration of the Diamond Jubilee of their beloved Queen, and the well-being of the people of this beautiful county so full of historic interest, in which it was placed. He had now formallly to declare the Castle-Douglas Cottage Hospital open. (Applause.)

Kirkcudbrightshire Advertiser
Oct. 20. 1899

Obituary.

ALEXANDER GRANT, F.R.C.S.Edin.,

Surgeon-Major Bengal Army (retired), Honorary Surgeon to Her Majesty the Queen.

Surgeon-Major Alexander Grant died in London on January 3rd at the age of 82. He entered the Indian Medical Service in 1840, landed in India in April, 1841, was appointed to Her Majesty's 55th Foot, and went with them to join the expeditionary force in China, when his ship was exposed to severe hurricanes off Hong Kong; he was present at the capture of Amoy, the capture of Tinghai, Chusan, and accompanied the regiment in pursuit of the enemy to Sin-kea-mun. In 1842 he joined headquarters at Chinhae, was present at the attempt to take the city by surprise, and at the capture of Chapoo. He was present at the storming of the batteries of Woosung, at the capture of Shanghai and Chin-kiang-foo. He was placed in charge of cholera cases of the 49th Foot, and then served with Lord Saltoun's brigade at Nankin, both duties involving heavy work as sickness was very prevalent. At the conclusion of peace, he returned to Chusan, and remained there with the 55th Foot during 1843. In 1844 he proceeded to Hong Kong, where he took leave of the 55th regiment which was returning to England, when Dr. Shanks, the surgeon to the regiment, paid the following tribute to the value of his services.

I cannot allow Mr. Grant to depart without expressing to him the deep sense of obligation I am under to him for the very valuable professional assistance he has rendered me on all occasions, and I cannot better record the high opinion I entertain of Mr. Grant's merits than by affirming that during a long course of active service in various quarters of the globe, I consider him one of the very best medical officers I have ever met with.

He was then placed in charge of a wing of the 98th Foot at Victoria, Hong Kong, and subsequently ordered to Madras with the 41st Madras Native Infantry. He returned to Calcutta and was sent on special duty to Madras and Bombay. In 1845 he was appointed Civil Surgeon of Bhagulpore, ordered thence in 1846 to join the army of the Sutlej on the outbreak of the 1st Sikh war, and encountered great hardships on the march. He was attached to the Field Hospital, Ferozepore, until the conclusion of the war, when he returned to Bhagulpore, where he remained till his appointment in 1848 as Civil Surgeon of Chapprah. He was ordered thence on special duty to the North-West Provinces by the Governor-General, Lord Dalhousie, who wrote to him as follows:

No medical officer in the service has been more strongly recommended than yourself, and I am truly desirous of obtaining the benefit of your services and your skill.

In 1849 he was appointed Surgeon to the Governor-General, Lord Dalhousie, which office he held for seven years, accompanying him in his various tours through different parts of India, Ceylon, and Burmah. He was appointed Secretary to the Medical Board, Calcutta, in 1852, and promoted to Surgeon in 1854.

In 1856 he prepared for the Governor-General a digest of all that had been written about the reorganisation of the Indian Medical Services, and sketched a plan which was adopted by Lord Dalhousie and formed the basis of that memorable despatch to the Court of Directors, which was the first liberal and enlightened acknowledgment of the claims of medical officers by any English statesman. The same year he was gazetted Presidency Surgeon and Surgeon to the Presidency General Hospital, the most coveted of Calcutta appointments. The following is an extract from the minute of Council on the occasion of that appointment:

The claims of Mr. Grant to this coveted appointment, founded on service in the field, on his standing in the Medical Department, on his personal character and professional reputation, will be questioned by none. I rejoice, before my departure, to have an opportunity by the nomination of Mr. Grant to this office, of placing the future charge of the General Hospital in most capable hands, and at the same time of evincing my own deep sense of the ability and skill and sedulous care which have characterised his attendance for more than seven years on my family and myself.

In the meantime he accompanied Lord Dalhousie, who was in failing health, to England, and when there was examined respecting the Indian Medical Service by the Parliamentary Committee. On taking leave of Lord Dalhousie he received from him a touching letter. He then, *en route* to India,

visited the chief hospitals in Europe. In 1857 Grant was appointed by the Governor-General to be Apothecary-General and Opium Examiner to the Government of India: also Member of the Senate of the University of Calcutta, and Government Examiner in the Medical College. In 1858 he was elected President of the Faculty of Medicine, and its representative on the Syndicate of the University. In 1859 he was thanked by the Governor-General in Council for his valuable services during the period of the Mutiny in making provision of medical stores for the army in the field, and by the Secretary of State in the following year for the same services. As Apothecary-General he compiled a code of rules for the Medical Store Department which was adopted by Government. In 1861 he proceeded to England on medical leave, was offered a dinner by his brother officers which he was compelled by failing health to decline, and subsequently was presented by them with a service of plate. He retired as Surgeon-Major.

Mr. Grant made many valuable contributions to Indian medical literature, among which may be mentioned, Medical Sketches of the Expedition to China (*Medical and Physical Journal of Bengal*, 1845); Diary of Chinese Agriculture, with illustrations (*Transactions of the Agri-horticultural Society of Bengal*, 1845). He founded in 1853 the *Indian Annals of Medical Science*, and was, till he left India, its joint editor with Dr. Chevers. He contributed to it the following papers: On Hill Diarrhœa and Dysentery, with some account of Himalayan Sanitaria, 1853; Note on the Preparation of the Bael Fruit, 1854; The Hill Stations, Murree, its Topography and Medical History, 1861; Fragments of the Medical Practice in Calcutta at the close of the last Century, 1st Fever, 2nd Dysentery. These papers owe their value to the fact that they were not only lucid in style and sound in theory, but eminently practical, thus reflecting the mind and character of the author.

The foregoing brief epitome gives but an imperfect idea of the Indian career and services of one of the most distinguished members of the Bengal Medical Service, whose name will long be remembered in India, especially by his brother officers of the Medical Service, for whose benefit he laboured so strenuously. His professional and personal character inspired respect and affection in all who knew him, whilst his unselfish nature, his unquestioned ability, and his calm and dispassionate judgment impressed all, whether in official or private life, with a strong sense of his value as a public servant. To his friends he endeared himself by the genuine truth of his friendship, his modest appreciation of his own merits, and his generous recognition of all that was good and deserving of praise in others.

Mr. Grant was educated at Glasgow and Edinburgh, and became a Licentiate and subsequently a Fellow of the College of Surgeons of Edinburgh. He held many important positions in India, and distinguished himself alike in the military, administrative, and civil branches of the service. He occupied for about seven years the post of Surgeon to the Governor-General, Lord Dalhousie, perhaps one of the greatest Governor-Generals that ever ruled over India; and it is well known how wisely the large influence he exercised over that nobleman was exerted on behalf, not only of his own service, but of all that was deserving of support or commendation. It cannot be doubted that to his influence and advice are mainly due the recognition of and improvements in the Indian Medical Service which resulted from the memorable despatch of Lord Dalhousie in 1856.

Mr. Grant's life was a long and useful one, and its utility by no means came to an end when he left India; for after his return to England he still continued to serve the public in many ways, and especially in connection with the distribution of the Indian Mutiny Fund, whilst his interest in the Service he himself had adorned never slackened.

The only public honour he received, except war medals, was that of being made Honorary Surgeon to the Queen. Had his career in India been prolonged, it is certain that he must have received other honorary distinctions.

Mr. Grant did not marry, but lived always with his sister, whose devotion to the end was unfailing, and for whom his many friends feel the profoundest sympathy.

His life was one of honour and distinction, and it terminated mourned by "troops of friends."

J. Fayrer.

Reprinted from the British Medical Journal, January 13th, 1900.

Western Morning News Feb 2. 1900

SCIENCE AND ART AT FALMOUTH.

PRIZE DISTRIBUTION BY SIR JOSEPH FAYRER.

After distributing the prizes and certificates

Sir Joseph Fayrer, speaking of the virtues of Falmouth as a winter resort, said: Whether they regarded that charming and genial port of the South of England from the point of view of a seaport, with a magnificent harbour —now, alas! comparatively neglected—or of a valuable place of residence, with great latent possibilities only needing development, it was to the results of the training afforded by science, art, and technical schools that they might look, in one direction at least, for impulses which should give impetus and continuity to further advance in working out that which would enable Falmouth to fulfil purposes for which by nature it was so admirably designed. Although one might not feel justified in anticipating any great revival of the shipping and commercial prosperity, everything pointed in the direction of that for which nature had so admirably designed Falmouth, a health resort of undoubted merit, which might be favourably contrasted with places abroad, now so popular. Projecting thought into a not very distant future, one liked to picture Falmouth as a beautiful health resort, with all the natural advantages of its situation developed to their utmost extent by a wise exercise of that artistic spirit for which it was well known, and which had already received so powerful an impetus from the genius of such masters as Henry, Tuke, and Ingram, whose impulses were doubtless quickened by the natural beauties that surrounded them, but whose feelings, one feared, must be more or less jarred at times by the marring of those beauties by the hand of inartistic man. Houses should be built with some regard for symmetry and architectural beauty, so placed as to add to the natural advantages rather than detract from them, as they did in many cases now, dotted about, as they were, promiscuously here and there, regardless of proportion and the future æsthetic development, comfort, and well-being of the place That school was practically limited to science and art. The technical side needed development if it was to take part, as it should do, in aiding the town to assume that position for which nature had designed it. As surely as he anticipated a great future for Falmouth, so surely did he feel convinced that if men required to carry out the work on the best lines were not forthcoming locally they would be procured elsewhere, to the detriment of inhabitants. In urging the claims of the technical side, let them not suppose that he undervalued the scientific teaching. That was most important, not only from a general point of view, but especially so with regard to sanitation—a subject of great significance to Falmouth at the present time—with which the technique of plumbing, architecture, and house-building was so much concerned, and which was the fundamental basis of the prosperity of every place, whatever its natural advantages might be. With reference to water supply and drainage, the most important elements in sanitation, Falmouth possessed great advantages, only needing recognition and development. Not only must there be sufficiency of the water supply, about which there should be no difficulty, and of the purity of which there could be no suspicion, and a perfect system of drainage, which should be equally practicable in a place with such natural advantages as Falmouth had, but the main sewage outfall should be removed to a greater distance, thus preventing the accumulation of deposits offensive alike to sight and smell, and so often perceptible, particularly at low tides, on the foreshore. Of course, such improvements could not be carried out immediately, nor without considerable expense, but their realisation must inevitably tend to the future prosperity of that picturesque and beautiful seaport. Let him urge the absolute necessity of giving practical effect to these reforms, for without them, whatever they cost, and whatever efforts might be made in other directions, no ultimate success would accrue. Difficulties might stand in the way, but they were only such as had existed and been dealt with satisfactorily in places less favoured by nature than Falmouth. Let it be hoped that the spirit of progress and enterprise would be no less potent here than it had been elsewhere. The inhabitants might rest assured that the money expended on it would be a sound investment and certain of its reward. (Hear, hear.) He went on to express his satisfaction at the fact that the State, while recognising the necessity of technical instruction, did not intend to neglect preliminary training, and realised that technical education was best assimilated by those who had had a good elementary education of the ordinary character; that, in short, it was only desirable that the individual should be competent in the mechanical procedure of his industry, but that he should be sufficiently taught beforehand to enable him to understand the scientific principles upon which it was based. Our country now abounded in technical and science schools of various grades and conditions, which were tending necessarily to elevate the people and to place and keep them upon an equality with other nations by whom the importance of such training had been hitherto more fully recognised. Competition was keen among the nations of Europe, and if Great Britain was to maintain the position to which she was considered to be entitled her people could not afford to let her drop behind in the race for knowledge; especially should the British be careful lest they be overpassed by those whom they should least have expected to excel. His own professional instincts reminded him that some part of the teaching in this school bore upon the simple and elementary rules upon which public health depended —such subjects, for example, as house building, chemistry, applied mechanics, and he should like to add plumbing. If the people could be taught to believe in the efficacy of pure air, pure water, cleanly habits, proper food and clothing, and could be induced to make efforts to secure these, and be taught to regard infective diseases as the scourge of uncleanliness and of their own disregard of the simple laws of health, the result would be not only greater usefulness and happiness, but better health, prolonged life, and the saving of money. Preventible diseases killed many thousands yearly, and considering the large number of cases of illness for each death, it had been calculated that some millions of days of labour were lost in this country annually, which, of course, represented a corresponding loss in money. Knowledge diffused among the people by this class of school must gradually tend to mitigate such conditions, to obviate the wasteful expenditure of health and life, and to promote not only the moral and social, but the physical welfare of the people. (Applause.)

THE HILL STATIONS OF INDIA
AS
HEALTH RESORTS.

An Address delivered to the Balneological and Climatological Society. May 30th, 1900.

BY
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M.D., F.R.S.

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THE HILL STATIONS OF INDIA AS HEALTH RESORTS.

I THINK I can hardly better fulfil the mandate of your esteemed President, Dr. Ivor Murray, to give an address to this Society than by inviting your attention to those mountain regions which play so important a part in the social and physical economy and well-being of our countrymen in India, and which, under the designation of hill stations, are familiar, by name at least, to all who have any knowledge of the conditions of life in that country.

Possibilities of Acclimatisation.

I propose to consider them, not merely in reference to the treatment of disease and convalescence, but also as resorts in which the European may preserve his health and avoid the physical deterioration which inevitably results from protracted residence in the plains, and where, indeed, it seems even possible that he may take root, thrive and propagate his race, a subject of ever-widening interest to our rapidly-increasing population, and for which there are grounds for belief that the prospects of success are not altogether unfavourable, though so far no conclusive proof is forthcoming. Past history shows, however, that colonisation by the unmixed European race in the plains of India is impracticable. In the very rare instances in which the third generation has been reached it had evidently attained its utmost desirable limits, whilst of the Portuguese who preceded us, no descendant unalloyed by native blood can be said to exist.

Physiography of the Indian Peninsula.

Before describing the hill stations let me recall to you briefly some of the physiographical characters of the great peninsula in which they are situated, and the climatic and physical attributes which so largely influence the conditions of European life in India.

The geographical position of British India, part within the torrid, part within the temperate zone, with the Bay of Bengal

on the east and the Arabian Sea on the west, its physical characters, comprising lofty mountain ranges rising in the north to the abodes of eternal snow, elevated plateaux and deserts, noble rivers and estuaries, vast plains formed by their basins and deltas, extensive forest tracts, jungles, and swamps invest it with peculiar interest from climatic and hygienic points of view, especially as regards the alien race who now control its destinies and to whom its future development and welfare seem to be committed.

India proper is a vast triangle with its apex at Cape Comorin and its base in the Himalayas. Its extreme length is 1,900 miles, its breadth at the base about 2,000 miles. It is situated between the 66th and 104th meridian of East longitude and the 8th and 35th parallel of North latitude. It is over 1,250,000 square miles in extent, contained within a coast line of about 4,000 miles and a land boundary of over 5,000 miles. The natural divisions are:

1. The Himalayan and Sub-Himalayan region.
2. The Indo-Gangetic basin and deltas.
3. The peninsula proper formed by the elevated plateau of the Deccan bounded on each side by the Ghauts and the littorals between them and the ocean.

The Himalayan range extends for about 1,750 miles, crescentially, N.W. and S.E., with a breadth of from 150 to 250 miles. The mean height is from 16,000 to 20,000 feet, and there are several high points, amongst them Kinchinjunga 28,176 feet, and Everest 29,002 feet, the highest measured peak in the world. The Sub-Himalayan region consists of ranges separated by broad valleys, bounded in part on the south by the Siwalik range and the Terai. It is in the lower ridges of this range of hills, at elevations up to 7,000 feet, that many of the hill stations lie.

The Indo Gangetic plain or Hindostan proper which separates the Himalayas from Southern India, forms the richest and most populous parts of the empire. The great rivers Indus, Ganges, and Brahmaputra water this region and contribute to its formation.

Tropical or Peninsular India is bounded on the north by the Vindhyan system of hills, consisting of various ranges from 1,500 to 4,000 feet, which extend for nearly 800 miles from east to west, and include also the Aravalli, Kaimoor, Satpura, and other ranges. The Eastern Ghauts form rather a descent from the plateau to the littoral than a distinct mountain range. They extend along part of the east coast with an average elevation of 1,500 feet and occasional high peaks, with broad tracts of level ground between them and the ocean. The Western Ghauts extend from near the Tapti river on the west down the coast to Cape Comorin, with an average height about 3,000 feet, ascending to between 4,000 and 5,000 feet, as at Mahableshwar. Between these three ranges the peninsula of India is raised into the plateau of the Deccan. It has an elevation of from 1,000 to 3,000 feet, a region of open valleys and easy slopes, with isolated peaks here and there, and ranges of hills, of which the most important are the Nilgiris, whose highest point is Dodabetta, 8,760 feet.

There are two great slopes of drainage, into the Bay of Bengal on the one side and the Arabian Sea on the other. The Bay of Bengal receives the Ganges, Brahmaputra, Mahanaddi, Godavery, Kistna, Cauvery, and others, whilst the Arabian Sea receives the Indus, Nerbudda, Tapti, and some others.

Climate and Seasons.

These geographical and physical characters involve many varieties of climate, and between Northern and Tropical India, according to latitude, elevation, and other physical attributes, every degree of difference in temperature, humidity, or dryness is found.

There are three distinct seasons in India—the hot, the rainy, and the cold—which vary in time of setting in and in duration according to latitude, elevation, and other physical conditions. Approximately the cold season extends from November to March, the hot from March to June or July, and the rainy from that to October, these seasons being greatly influenced by the monsoons.

The monsoons, which do so much to determine the conditions of climate and health as well as the production of food, are the result of the northern flow of currents of air bearing moisture from the ocean, as the S.W. monsoon, and again their reflux, as the N.W. monsoon, which also brings rain to Southern India. In both cases they are more or less deflected or modified by the physical conditions of the country over which they pass. The S W. monsoon is the great carrier of rain to the whole of India. Saturated with moisture, it deposits it in the form of heavy rain upon the Western Ghauts, where it first impinges and where the greatest amount falls; but passing over extensive tracts of desert land, it deposits very little rain until further north, when, on impact with the Himalayas a large fall takes place. For example, at Mahableshwar in the Western Ghauts 300 inches of rain fall in the few months of the rainy season; and again, on the N.E. frontier, in that prolongation of the Himalayas into the Aracan Yomas, on the plateau of the Khasia and Jyntea hills, at an elevation of 4,500 to 6,000 feet; at Cherra Poonji, 4,200 feet, the large amount of 600 inches falls, the largest rainfall known in the world; whilst at the corresponding latitude on the west, in the desert of Sind and Rajputana, there is almost no rain, not that the air is not charged with moisture, but that the conditions of condensation do not there exist.

Hill Colonies.

In such a variety of climates and different elevations, with great swamps and deltas on the one hand, and arid, dry, sandy plains on the other, with an almost universal presence of malaria and great solar heat, all those conditions exist which give rise to the well-known forms of tropical disease, render the plains of India unsuitable to be the permanent home of the European, and emphasise the expediency of seeking sites in the more elevated regions where Europeans may find immunity from them. Many such stations have now become health resorts, of which the advantages are very great, not only in preserving the health of those yet unaffected by the climate of the plains, but for invalids who, without being the subjects of organic disease, have suffered from the wearing effects of climate and work, and in some cases for those convalescent from certain tropical diseases, thus obviating the necessity for long and extensive voyages and prolonged absence from duties.

In considering the question of hill stations, it is to be remembered that the welfare of upwards of 100,000 Europeans

is concerned. A very large number of these are destined to spend a great part but not the whole of their lives in India, and it is of the utmost importance for the preservation of their health and vigour to utilise those localities in which this object may be to so great an extent attained. The search for and adoption of others and the endeavour to improve by sanitation or by any other means the condition of those now existing, have always seemed to me worthy of the attention and consideration of all interested in the welfare of the community.

In some of the hill stations, more especially those to the south, at elevations between 4,000 and 7,000 feet, a certain number of Europeans have settled; but sufficient time has not elapsed to show how far this commencement of colonisation may develop and ultimately succeed. For those who have assured means of living and who are not solely dependent upon their professions or labours it seems probable enough that the results may be satisfactory. It also seems possible that the various industries connected with tea, coffee, and cinchona planting and minerals may afford the means of subsistence, notwithstanding the competition of native labour, and so in time European communities of considerable extent may arise and flourish, producing men fitted to carry on work in the plains, returning at intervals to their homes in the more elevated regions. But this remains to be proved.

The great proportion, however, of Europeans who live in India and conduct the commerce, government, and other public affairs would still have to be imported from Europe, and I do not say that the necessity for occasional return to Europe can ever be entirely obviated, for cases must occur in which this will be necessary, not only for recovery from disease or for the re-establishment of perfect health, but for moral and social reasons. Still, I am under the impression that full advantage has never been taken of these hill stations, and it is satisfactory to know that they are capable of considerable extension. I may here express a hope that those who are in a position to do so will endeavour to bring about the realisation of that which would certainly be of benefit to our race in India. I can hardly, indeed, imagine a more profitable subject for the consideration of a Society such as this, whose opinion would carry so much weight.

One obstacle to the progress and success of such colonisation would be found in the limited area of the elevated tablelands and their intersection by deep valleys, but this is not universal. There are regions more promising in this respect —for example, the Khasia and Jyntea Hills, between Bengal and Assam, where the elevated plateaux are broader and more extensive, with undulating ground, at a height that would be favourable to the European constitution. The late Inspector-General Maclelland, an observer of great scientific acumen, in discussing this subject, writes of these hills:

> The elevations, more about the centre of the tablelands, are broad and extensive downs, with favourable soil and plentiful supplies of water, with coal and other resources at hand suitable to the enterprise of Europeans, which seem to leave nothing to be wished for in regard to this locality, but greater facilities of communication in order to render it all to be desired.

In this I thoroughly concur, having known this part of the country, and being much struck with the general character of that between Cherra and Shillong, and its aptitude for this purpose. The greater facilities for communication in these

days by rail and steam are gradually diminishing the objections at that time considered to be inseparable from its remote position. He says of another region:

Proceeding from Hazaribagh further to the west, we have a range of high country parallel to the Ganges, presenting fine tablelands at Sohagpore, the elevation of which has been variously stated at from 3,000 to 5,000 feet. Again, in the district of Ramghur, in the Saugor and Nerbudda territories, are high tablelands, which had then been imperfectly explored, but the elevations were known to be from 3,000 to 5,000 feet. Here during the month of May the climate is truly delightful. Everything around is fresh and green, the air is elastic and buoyant, with dew falling every night. Fifteen or twenty days seldom pass, even in the dry season, without showers. Again, in the Mahadeo hills is the tableland of Pachmahri, in the Nagpore district, elevated 3,500 feet. The soil is light and sandy.

Of this it was written in 1839:

In the month of May the climate has been known to be such as to suit the most delicate European constitution, while the cold season is intensely cold and invigorating.

This place has now become a station. The same writer remarks:

A bracing climate, mineral treasures of unexplored value, rich and unappropriated lands, abundance of moisture for all agricultural purposes, beautiful scenery, and a vast variety of products of almost every description, are to be found in these tablelands, to which Providence has been so lavish in its gifts, but which man has not yet been taught to appreciate.

Although much has been done since Dr. Maclelland wrote, there is good reason to believe that in the vast mountain ranges and tablelands of India the physical and climatic conditions necessary for the preservation of health and perhaps even for the permanent colonisation of the European will be found to exist to a much greater extent than has hitherto been supposed.

For example, the late Colonel Warburton, who was Superintendent of the Khyber, has recently pointed out Tor Sapper, in the Khyber district, north of Landi Kotal, and 32 miles west of Peshawar, at an altitude of from 5,300 or 5,600 feet, which is capable of accommodating 1,500 soldiers, and also other elevated regions in the same district with equal advantages, which have all the conditions favourable to European health, and which he strongly recommends.

Hill Stations.

Considering, however, how little was known of the hill climates of India half a century ago, it is interesting to note the number of instances in which they are now resorted to, and to learn what service they have rendered both to the civil and military population. Since the late Sir Ranald Martin urged the attention of Government to the matter, and pointed out the importance of locating the European troops as much as possible at elevated regions, the number of hill sites at which the British army is stationed has greatly increased, and their vital statistics contrast favourably with those of India generally, the death-rates being respectively about 14 and 23 per 1,000 in 1897, an unusually sickly year, the latest officially reported. According to the last report of the Sanitary Commissioner with the Government of India, of the 68,000 European soldiers now in India, there are 3,000 in convalescent depôts and hill sanatoria, and 7,000 are stationed in the hills. I am inclined to think this number might be increased. The facilities of communication are now so much

greater than they were, say, at the time of the Mutiny, that there would be little difficulty in getting at them in any sudden emergency.

Time does not permit me to do more than a brief description of a few of the typical hill stations of the Himalayas, of the Ghauts and Vindhyan range, and of those more southern regions where the two systems of the Ghauts unite, forming the great mass of the Nilgiri hills. The chief hill stations of popular resort are in the extra-tropical districts—that is, the Himalayas, Dalhousie, Dharmsala, Marri, Abbottabad, Thandiana, Simla, Missouri, Landour, Rainkhet, Naini Tal, Almorah, Darjeeling, Cherra Punji, Shillong, at heights of from 4,000 to 7,000 feet; in the Nilgiris, Utacamand, Conoor, Wellington, Kotagherri; Pachmarhi, in the Central Provinces; Mount Abu in Southern Rajputana, in the Aravallis; Mahableshwar, Matheran, and Khandalla, in the Western Ghauts, near Bombay. There are several others, but even of those mentioned I can only describe a few, and shall take as sufficiently illustrative of the extra-tropical Darjeeling, Naini Tal, Simla, and Mount Abu; of the tropical, Mahableshwar, Matheran, and the Nilgiris, for what is said of those applies to a great extent to the others.

The Tableland of Mahableshwar, latitude 17° 58′ N., longitude 73° 42′ E., in the Western Ghauts, about 290 miles *viâ* Poona from Bombay, is of considerable extent. Its mean elevation is 4,500 feet above the sea; it is rugged and undulating. It varies from eight to fifteen miles in breadth, and is seventeen miles from N.E. to S.W. The station occupies the north-westerly region of this tableland, having a south-west aspect, and is densely wooded; there are excellent rides and drives. It is composed of basalt, trap, and laterite. The mean annual temperature is 66°, daily range 8°, maximum of summer 89°, ordinary limit of winter cold 40°. The rainfall here, as I have already pointed out, is very great, the average being 229 inches, though frequently more; but the natural drainage rapidly carries off this surplus water. The drinking water is good, the vegetation luxuriant. The headquarters of the Government of Bombay are established in this station, which is naturally the great hill resort from Bombay, as well as from many other parts of India. The elevation and position of this station afford a delightful climate. Malarial fevers do not occur, and cholera is said never to have originated here. The season extends from March to June, and the greatest heat is in March and April, when the thermometer may rise to nearly 90°, but the nights are almost always cool and refreshing. Winds are variable, sometimes from the east, but there is a daily sea breeze, which goes on blowing till the monsoon sets in. Thunderstorms are frequent after April, and in May the atmosphere becomes moister by day, while mist and cloud envelop the hill by night and in the early morning. Early in June the monsoon bursts and the rain falls in deluges, during which time the mean temperature is about 63°. In September the monsoon ceases, and by October the weather has become settled. The change from the heat of the plains now affords great relief; in November the air becomes cooler and drier, weather fine, mean temperature 62°; the greatest cold only produces slight hoar frost. The days are mild and genial, the atmosphere bracing and elastic, and the nights are cool. The periods both before and after the monsoon are those at which

the place is desirable as a residence. The scenery—mountain, sea, and waterfall—is magnificent. Recovery from most maladies, except hepatic, dysenteric, or rheumatic, is accelerated, and to those jaded and exhausted by some forms of disease, long exposure, or hard work, the transition to the greater altitude and more elastic air is often very beneficial.

Mount Abu is in the native State of Rajputana, and is separated from the Aravallis, to which it really belongs, by the valley of the Western Banass River. It is situated in latitude 24° 35′ N., longitude 72° 53′ E., and is about 420 miles from Bombay. Its base is about 50 miles in circumference, and its average height 4,000 feet above sea level. It is very irregular on the surface, and the highest peak is over 5,600 feet above sea level. It is composed of granite, with a mixture of blue slate and quartz. The inhabited part is a basin perforated by ravines, studded with hills, and surrounded by higher eminences, from which gorges descend to the plains. The distant views are very picturesque; vegetation is luxuriant and semi-tropical; a lake about two miles in circumference is found on the western side of the station. The hill sides are well wooded, and at the beginning and termination of the monsoon it has its most charming aspect, green with vegetation and brilliant with flowers, and all the little valleys are filled with clear streams. The mean annual temperature is 70°, the average maximum in summer is 92°, the extreme 98°; in the winter the temperature is about 50°, but occasionally it freezes at night, and hoar frost covers the ground. The daily temperature is, on the whole, equable, and the station is sheltered from the winter east winds. The rainfall averaged during 10 years 64 inches, August being the most rainy month. It is often enveloped in clouds during the monsoon. Though the summer is warm it is a great contrast to the heat of the burning sandy plains below, and is generally tempered by refreshing breezes, the atmosphere is light and elastic, and the nights cool. It is raised above the hot winds, but is not altogether free from malaria, especially from October to the end of the year. The water is somewhat uncertain in quantity though good in quality. The advantages of this station as a dry, tonic climate, without great vicissitudes of temperature, are considerable, and are much appreciated. It is susceptible of further development, which doubtless will take place as time goes on. It is now the headquarters of the Rajputana Political Agency, one of the Lawrence asylums for European children, and a sanatorium for British troops. It is a great place of resort for those who are exhausted by climatic causes and hard work, and for convalescents after any ordinary maladies, except hepatic and confirmed forms of bowel complaint, or those who have suffered from severe malarial fever, and are liable to recurrences of it.

Matheran (latitude 18° 58′ N., longitude 73° 18′ E.). which rises abruptly from the plain, consists of trap rock and laterite, is very irregular in form, its central ridge is about a mile and a half long and half a mile in breadth, with spurs which are known by various names. Its proximity to Bombay (only about twenty miles as the crow flies) makes it of great value to that city. It can hardly be dignified by the name of a hill station, but as it illustrates remarkably the advantages of even 2,460 feet of elevation, in its cooler atmosphere, its

pleasant breezes and proximity to the sea, it is worthy of mention. The rainfall is heavy, amounting sometimes to 250 inches in the season, when Matheran is not desirable as a residence, but it runs off quickly. In the cold weather, from the middle of October to the beginning of March, the temperature rarely reaches higher than 78° by day and 70° by night, but in March and April it may reach as high as 90° with a mean of 80°. The place appears to be free from malaria. Persons who have suffered from overwork and heat and who are convalescent after illness, other than malarial fevers or hepatic disease, will find it beneficial, and by resorting to it may sometimes avoid the necessity for more prolonged absence and change.

The Nilghiris.—In the south of India, in the Madras Presidency, a tract of mountain country lies between 11° 12′ N. latitude, and 76° 18′ and 77° 15′ E. longitude. These are the Nilgiris, the total area of which is 957 miles, the surface undulating, in some parts not much wooded, and the fall to the plains sudden and abrupt. In other parts of these elevated lands there are extensive forests. The general elevation of the tablelands varies from 6,000 feet to about 7,600 feet. There are several high peaks; Dodabetta, the principal, measures 8,761 feet. In the high lands some European settlers have already established themselves, and there are four European stations: Utacamand, 7,361 feet; Wellington or Jackatalla, almost exclusively military, 6,100 feet; Conoor, 5,886 feet; Kotagherri, 6,571 feet. These hill stations are justly in great request, and much frequented. Their elevation in that latitude, their relative proximity to the sea, and the influence exercised over them by the monsoon, produces a climate well suited to the European constitution, in which our race may maintain its healthful vigour, and where there is good reason to believe that, other accessories being favourable, a permanent home for the European race might be, and indeed is, established, though of course time alone can determine in what this attempt at colonisation will result. When compared with the elevated stations of the Himalayas, the distinctions arising out of differences of latitude, proximity to the sea in the one case and to the snowy range in the other, are expressed in the Nilgiris in the greater equability of the climate, neither the heat nor the cold being excessive; whilst the configuration of the country itself, with it long, undulating plains, renders it more suitable to the habits and constitution of the European. Time does not permit of my dwelling upon the physical aspects, and on the magnificent scenery presented by these mountain peaks, undulating plains, and rushing rivers; but let me say a few words about Utacamand, the chief station, and Conoor and Kotagherri, which seem to be so intimately associated with each other, invalids or others frequently finding a sojourn at one of these places a wise preliminary to that at Utacamand; whilst Wellington holds a high place in the medical annals of the British army, upwards of 1,000 men being in the convalescent depôt there.

Utacamand is situated in an elevated valley or basin surrounded by hills, and has a lake in the centre; there are few trees in its immediate vicinity. From its peculiar geographical position, it feels the influence both of the S.W. and the N.E. monsoon; the rainfall is heavy—according to Hunter 45 inches annually—though it varies in different parts of the Nilghiris, the highest fall being in June and July brought by

the S.W. monsoon; this is the most unpleasant season. The N.E. monsoon sets in in October, and is also accompanied by rain; the months of November and December are showery, and the latter cold; the atmosphere after that becomes dry. January, February, March, and April are clear, with dry north and east winds. The mean annual temperature is 58°; in the hottest season it seldom exceeds 75°—it may drop at night to 54°—but the mean range seldom exceeds 9°. The hottest month is May, the coldest are December and January, when the freezing point is sometimes but very seldom reached at night. At this time the range between the hottest part of the day and the coldest part of the night is about 16°. In the cold season, in the rarefied air, the sun's rays have great force, and even in this comparatively equable climate it is necessary to guard against sudden changes of temperature. From difference in altitude, locality, and physical characters generally, varieties of climate are within easy access.

Conoor is milder and less subject to these sudden changes of temperature, and therefore more suitable to delicate persons on first going to these hills. The climate generally of the Nilgiris is suitable for all conditions of depressed health, or after disease contracted in the plains, except, as in most other hill climates, those of hepatic or dysenteric nature. Conoor is not so high as Utacamand, but is much more beautiful, as the sides of the hill are wooded. The mean average temperature is 64°, of the summer 70°. It is more relaxing than Utacamand, and in the winter is more sheltered from the north-west, to which the latter is exposed. The waterfalls that occur during the monsoon are most picturesque, one at no great distance being 400 feet. At this elevation the tropical character of the vegetation ceases. Most of these remarks apply to Kotagherri, which is only a little higher than Conoor.

Darjeeling, latitude 27° 2′ N., longitude 88° 18′ E., about 400 miles from Calcutta, and easily and rapidly accessible by rail, is situated in a district of the Sikkim Himalayas, 138 square miles in extent, which was acquired from the Rajah as a sanatorium in 1835. The height of the ridge varies from 6,500 feet to 7,500 feet above sea level. Most of the houses are perched upon this ridge, others are on the side, with a S.W. aspect. Rather more than half-way up is the station of Kurseong at an elevation of about 4,500 feet, where it is sometimes better for Europeans to sojourn for a time before going to the greater elevation of Darjeeliug. The geological formation is chiefly micacious shale and gneiss, with granite, sandstone, and slate. The S.W. monsoon produces a heavy rainfall averaging from 120 to 150 inches in the year. The humidity of the atmosphere is consequently considerable, especially during the fogs and rains of the monsoons. The climate, however, is very equable, in which it differs from other Himalayan stations. Snow falls in the winter to a much less extent than it does at Simla, and the winter is milder. The mean annual temperature is 56°, the maximum in July is 70°, in May 65°, in December 52°, the minima being respectively 59°, 51°, and 36°. The views from the station and the surrounding localities are very fine; the low valleys on the one hand, some with rivers flowing through them, and on the other hand range upon range of snow-clad mountains from 15,000 feet up to 28,000 are exceedingly picturesque and mag-

nificent. The roads are numerous and well kept, sanitation is good, and the water supply fine and sufficient. The flora is very varied—fine trees, such as saul, magnolia, oak, chestnut, toon, coniferæ of all kinds, and rhododendrons, whilst ferns, creepers, and numerous flowers, such as orchids, abound, and the cinchona plantations—a recent but rapidly-increasing and important industry—not far distant, are most interesting. The climate in March and in May is like that of Europe. During the monsoon the rain is disagreeable, but there are frequent intervals in which the climate is pleasant enough. From October to March the weather is sunny, bright, and cheerful, the nights cold, clear, and sometimes frosty. Darjeeling is the summer residence of the Lieutenant-Governor of Bengal, and is resorted to by numbers, many of whom are planters in the Terai and neighbouring districts.

Though the Terai itself and the valleys are malarious, yet the fever never originates in the station, it being raised above malarious influences, and people from the Terai suffering from fever recover speedily at this station. Whilst diarrhœa is not infrequently found at other Himalayan stations, it is comparatively uncommon at Darjeeling, nor does there seem to be any special tendency to bronchial troubles. As a change, which is so necessary after long residence in the plains, where exhaustion and hard work have deteriorated the general health, and where there is no definite organic disease, and no complications, such as asthma, cardiac or cerebral disease, thought not to do well here, it is of the greatest value as a health resort. Delicate people and young children especially thrive almost as well as they would in Europe.

Naini Tal in Kamaon, in the N.W. Provinces, latitude 29° 22′ N., longitude 79° 29′ E., may be described as an amphitheatre surrounded by hills which are 2,000 feet higher except on the S.E., where it is open to the plains. Between the main range and a spur called the Ayapata is a valley with a pictureque lake or *tal*, probably an ancient crater, from which the place takes its name, about one mile long and a quarter of a mile broad. On the slope above this lake the present station is built, and at various elevations. The height of the lake above the sea is 6,400 feet, and the hills surrounding it rise to 8,500 feet, the ascent from the station being rather precipitous. From some ridges near the station magnificent views of the snowy ranges, including some of the higher peaks, are to be seen, with the intervening valleys and lower ranges gradually leading up to them. The scenery of the station itself and the views of the lake are most picturesque, while the flora is varied, consisting of rhododendrons, cypress, ash, and a variety of flowers and ferns. English vegetables and fruits are also produced in the cold season. The geological formation is clay, slate, and limestone, with light friable soil. In 1881 it was the scene of two serious landslips which destroyed many buildings and several lives. This station is the summer resort of the Government of the N.W. Provinces, and consequently is much frequented. The climate is bracing and invigorating except in the rains. The average rainfall is 70 inches, but in some years it is double that amount, and it rains more days in the year than at other places. During a period of seven years it was recorded that some rain fell in every month except October, but August is usually the wettest month. The temperature in summer rarely exceeds 80°, and

in winter it may sink to the freezing point. The maximum and minimum are: in May 78° and 48°, in June 69° and 59°, in July 78° and 61°, in August 76° and 62°. Water is derived from springs and is good, and the sanitation of the place is carefully provided for. In the cold weather invalids and children may be out most of the day, though occasionally snow falls. February and September are said to be most disagreeable months.

This picturesque and beautiful station is very easily accessible by the railway to the foot of the hill and thence by good road, and there seems to be ample accommodation for any number of visitors. Those are most benefited who have been debilitated by long residence in the plains or who have suffered from frequent attacks of intermittent fever, or other diseases unattended with organic complications. As is the case with the hill stations generally, it is not so beneficial for hepatic or dysenteric troubles, and it is not free from occasional occurrences of so-called "hill diarrhœa," and indeed from rheumatism and neuralgia, due to its exposure to occasional cold northerly winds. Cases of bronchitis and croupy affections in children are also of occasional occurrence. Persons who suffer from any organic disease, cardiac or other, should not go there without medical authority, and as the transition from the plains to this greater elevation is sudden, delicate persons should not undertake it without the sanction of their medical adviser. There is here a convalescent depôt for European soldiers in which in 1897 there were 123 inmates.

Simla (latitude 31° 6′ N., longitude 77° 11′ E.), in the district of Simla, in the north-east corner of the Punjab, the largest and most important of the Himalayan stations, is on a ridge of the sub-Himalayan system, of a crescentic form, culminating in the east in the peak of Jakko, and in the west in another peak, Prospect Hill. From Jakko the ridge gives off another spur to the north called Elysium, and another to the east called Mahasu; it is, in fact, a series of ridges and spurs upon which the numerous houses are most picturesquely situated, on the north aspect of which is the snowy range, and on the west the plains at a distance of about 40 miles. The area of the whole district, obtained from the Patiala Rajah in the first quarter of the century, is about 18 square miles. It is approached by good roads, but the rail, which already reaches to the foot of the hills will no doubt, as in the case of Darjeeling, be extended nearer to the station. The scenery is very picturesque; to the north the mountain ranges on the other side of the Sutlej valley are covered with dense vegetation, whilst in the distance is the magnificent panorama of the snowy range. The valleys to the north and south are also beautifully wooded, whilst the Kussouli and Sabathu hills, at a lower level, which are military sanatoria, are seen, with the plains of Umbala, extending far in the distance. The hills generally about Simla are well wooded by oak, deodar, and rhododendrons, which are very beautiful. These mountain ridges are composed chiefly of metamorphic rocks, shale and conglomorate, limestone and mica. The average height of the station is 7,100 feet, the fir-clad peak of Jakko rising to 8,000 feet. The average rainfall is 76 inches, but it varies, ranging from 50 to 100 inches, and during the rainy season there is much mist. The mean annual temperature is 60°; in the hot season it frequently attains to 85° or 90°, whilst in the cold it may fall to 22° at night. From the

middle of March and in April the mornings and evenings are fresh and cool, the day bright and pleasant. In May it is warm and dry with a temperature from 70° to 80°. In June, the hottest month, the temperature may rise to 90°; in the middle of June there is a certain amount of rain, but in July the regular rains begin, which continue with intervals till the middle of September. During this period the atmosphere is damp and the station is often enveloped in clouds. Bright and bracing weather follows the rainy season, and in October the air is peculiarly bright and clear and the scenery is then very beautiful. Snow begins to fall in December, increases during January, and sometimes lies deep on the ground. The air is then dry, calm, and bracing, and very agreeable to persons in good health. *Chini*, another ridge, is well known for its dry elastic atmosphere and moderate rainfall, the climate being bracing and healthy like that of Switzerland. Complaints have been made from time to time about the sanitation of Simla and of overcrowding. The water supply is good, having been lately improved. Simla is the summer resort of the Viceregal Court, and is naturally a most popular station, and much frequented, not only during the season but also throughout the winter. The climate is beneficial in ordinary malarial diseases, if unaccompanied by structural changes, but, as in the case of other hill stations, it is specially useful after prolonged residence and hard work in the plains. Like the other, also, it is unsuitable in dysenteric, hepatic, cardiac, or lung complaints. Hill diarrhœa is not infrequently seen and requires special precautions, especially in those who have any tendency to bowel complaints or have just come up from the plains and are more than usually susceptible to alternations of temperature. Children thrive well here, but the question of their remaining during the winter may require consideration. At Sanower, close by, is the Lawrence Asylum for European children. Here also, as at Sabathu and Kussouli, a few Europeans resort. The climate of Simla, in 31° N. latitude, as compared with that of Utacamand in latitude 11° N., at about the same elevation, shows a considerable contrast in its extremes of temperature, both of heat and cold, and the greater equability of the climate is very frequently the reason why the more southern hill stations are preferable to the northern, especially in the case of certain diseases or constitutional peculiarities in which these are important considerations. Such questions can be best determined by medical authority on the spot, but it may be safely said of all, from 4,000 to 8,000 feet, in whatever latitude, that they are of exceeding benefit to Europeans, for here they are placed above those morbific influences which determine the forms of tropical disease and in an atmosphere not too rarified to be prejudicial.

Hill Stations as Health Resorts.

It is also worthy of consideration (and nowhere could this consideration be more appropriately given than by this Society) whether the hill stations of India might not be more resorted to by people from our own islands, when prolonged absence from this country is necessary and residence in a milder and more genial climate sought for. The evils of the winter in England might be avoided by residence in the plains of India or on the plateau of the Deccan, and if necessary that absence

should be prolonged, the hot weather in India might be beneficially spent in one of the hill stations.

There are many other hill stations in India, and amongst them might be included the lofty valley of Cashmere, in which all the advantages resulting from altitude, pureness, and rarefaction of air, and removal from the various conditions which give rise to tropical diseases are found. But it is impossible for me in the short time at my disposal to enter into any description of these or other cognate subjects of the greatest interest.

I have endeavoured briefly to indicate certain points with regard to the hill stations of India which I thought might form the subject of profitable consideration in a Society such as this, so eminently qualified to estimate their value and importance, and it only remains for me to apologise for having treated the subject so cursorily.

[The address was illustrated by paintings of the Himalayas by the Right Hon. Sir R. Temple, Bart., late Governor of Bombay; by photographs lent by Mr. Birdwood, C.S.I., Bombay Civil Service; and by photographs and sketches lent by the India Office, and by the Royal Geographical Society.]

THE SANITARY INSTITUTE.

Victoria

DEI GRATIA BRITT. REG. FID. DEF. IND. IMP.

BY

Sir JOSEPH FAYRER, Bart.

SECRETARY:

E. WHITE WALLIS, F.S.S.

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Victoria

Dei Gratia Britt. Reg. Fid. Def. Ind. Imp.

Obiit d. XI. ante Kal. Feb., A.D. MCMI.

[Excerpt from Vol. XXII, Part I., of the Journal of The Sanitary Institute.]

Victoria Dei Gratia Britt. Reg. Fid. Def. Ind. Imp.

Obiit. d. XI. ante Kal. Feb., A.D. MCMI.

By SIR JOSEPH FAYRER, Bart., K.C.S.I., LL.D., M.D., F.R.S.,

Physician Extraordinary to the King.

(Vice-President.)

SINCE the issue of the last number of this Journal, not only the British Empire but the world generally, has been plunged into mourning by the death of the great and good Queen under whose beneficent sway a vast population has advanced beyond previous record in the evolution of those material, moral and intellectual qualities on which the welfare and happiness of mankind depend. The Victorian age has passed into the domain of history, and we gratefully acknowledge the benefits it has conferred; at the same time we hail the inauguration of a new era in which the promise and potency of continuity and further progress of the work of its predecessor are clearly foreshadowed.

It seems fitting that on such an occasion some brief retrospect of the progress of Sanitary science during the past sixty-three years should appear in the Journal of a Society which is devoted to the exposition of that branch of knowledge and which has owed much of its wide-spread influence to Royal sympathy and encouragement. This has shewn no sign of abatement under the ægis of the Royal Duke who has presided over its destinies for so long, and who, after a period of seventeen years, still manifests undiminished interest in its work, and, with the help of other members of the Royal Family and of the leading representatives of Sanitary science, continues to render it valuable support.

This has been an age of progress and discovery; intellectual activity

has never been greater, scientific research never more profound or far-reaching, nor the practical application of the discoveries of science more remarkable. Among many subjects of import which have characterised the reign of the late gracious Sovereign, few afford greater cause for congratulation than the improvement in vital statistics, as evidenced by reduced death-rate, enhanced expectation of life, decline of some potential causes of death and the almost total extinction of others. The Sanitary Institute, which has now existed for twenty-five years, has taken no unimportant part in effecting these changes. It was the outcome of an impulse given to Sanitary Science by the Public Health Act of 1875, which was itself one of many beneficial enactments of the late Queen's reign.

Up to the time of Queen Victoria's accession the great mass of the population of our islands lived and died under conditions which violated the now well-known principles upon which health depends. Prejudice and ignorance obstructed progress, Government looked on with indifference, the people knew little and thought less of the importance of pure air, pure water, cleanly and uncrowded dwellings, temperance, and other conditions which are now known to be essential to health. But under the influence of such reformers as Chadwick, Parkes, Simon, Buchanan, Corfield, Rawlinson, Galton, Rogers Field, and many others, measures formerly regarded as mere theories of no practical value, are now accepted and acted upon. Statesmen have learnt to realise that Sanitary Science is an important element in practical politics, and that it is the duty of executive governments to protect the people from disease which may and can be prevented or controlled, and the ministrations of officers of health, sanitary engineers and inspectors, consequently provide that the poor shall no longer be a law to themselves. Public health, in short, is cared for to a degree utterly unknown in the past, as evidenced by the reduction of the general death-rate from 22·4 in 1841 to 18·7 in 1895; houses are better built, sewerage, drainage and ventilation, are insisted on, the land is better cultivated, the subsoil better drained, the importance of pure drinking water is fully recognised, food is better, clothing more adapted to the climate, and, were Acts which are in existence compulsory and not permissive, little would remain to be desired.

If we turn to the public services, *i.e.*, to those who live under the control of the State, we find that, not only in respect of the duration of life, but also the prevention and cure of disease, the influence of sanitary science has been remarkable. For example, for some time after the Queen's accession, the death-rate of the British Soldier in India stood at about 56 per 1,000, but has now declined to 15 per 1,000, and has been as low

as 10. Epidemic disease, no doubt, disturbs the regularity of the death-rate, but it is certain that there has been great improvement. In the British Army generally the results of the Royal Commission, which was appointed to enquire into these subjects after the Crimean War, show that the death-rate has fallen from 16 or 18 to less than 6 per 1,000.

Great advance has been made of late years in the knowledge of the etiology and prevention of disease. The various steps by which it has been acquired cannot be related here, but its importance in respect to Hygiene must be acknowledged to be incalculable, for without it, although empirical methods may be of some value, no real progress can be maintained.

Nothing in the history of the development of Hygiene is more remarkable than the influence it has had upon the methods of prevention as well as of treatment of epidemic diseases. However much or little we may have accurately determined as to their real causation, we have at least learnt the conditions under which they thrive, become diffused, and increase in intensity. The rigors and terrors of quarantine have consequently been abolished, and reliance is now placed upon isolation and sanitation. The beneficial results of this mode of treatment are illustrated, for example, by the control that has been exercised over cholera, from which our country was comparatively free when it was prevalent all round us on the Continent.

That general progress is likely to continue can safely be predicted from the fact that the spirit of scientific research is so active in all directions and so genuine. It has led to much and must inevitably lead to more, to generalisations of increasing importance and value. Therefore, Sanitary Science looks forward with peculiar hopefulness to the new régime, feeling assured that the Sovereign who, as Prince of Wales, always gave evidence of deep interest in science, especially sanitary science, and in the maintenance and improvement of great hospitals, will, in his more exalted position, still continue to extend the benefits of his influence to its further development, and that the efforts of the British Congress on Tuberculosis, which His Majesty has graciously consented to patronise, will afford another signal example of the beneficial results of the alliance of power with science.

THE SANITARY INSTITUTE.

Field-Marshal His Royal Highness
George William Frederick Charles, Duke of Cambridge,
Earl of Tipperary, and Baron Culloden.

BY

Sir JOSEPH FAYRER, Bart., K.C.S.I., LL.D.,
M.D., F.R.S.

(VICE-PRESIDENT.)

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H.R.H. THE DUKE OF CAMBRIDGE, K.G.

FROM A PHOTOGRAPH TAKEN AT THE CONGRESS OF THE INSTITUTE HELD AT NEWCASTLE-ON-TYNE IN 1896.

[Excerpt from Vol. XXV., Part I., 1904, of the Journal of The Sanitary Institute.]

OBITUARY.

Field-Marshal His Royal Highness George William Frederick Charles Duke of Cambridge, Earl of Tipperary, and Baron Culloden.

By SIR JOSEPH FAYRER, Bart., K.C.S.I., LL.D., M.D., F.R.S.

(Vice-President.)

THE announcement of the Duke of Cambridge's death on the 17th of March, 1904, was received with the greatest regret by the community generally, as well as by the public institutions over which he presided or with which he was connected, and which had benefited by his great experience and practical common sense, his cordial sympathy and his valuable co-operation. By none, probably, was the sad event more deplored than by The Sanitary Institute, of which, at the time of his death, His Royal Highness was the venerated and greatly respected President. It is in association with the affairs of this Institute that we now refer to the late lamented Royal Duke, the catholicity of whose sympathy with the Army of which for forty years he was the head (as well as with numerous charitable, beneficent, and other public bodies in which he took the greatest interest, and on whose behalf he exercised the influence of his generous, kindly, and philanthropic nature as well as that arising out of his exalted position) has been fully and gratefully acknowledged in the various obituary notices which have already appeared. It is, however, becoming that The Sanitary Institute, for which the Duke did so much, should place on record a separate notice of His Royal Highness's services on its behalf.

The Duke of Cambridge became a member of the Parkes Museum in July, 1883, when the Duke of Albany was President. On the incorporation of the Museum with The Sanitary Institute in 1888 he joined

the amalgamated society, in 1895 was elected President, and from that time onwards his efforts had been strenuously devoted to its development. He was present at the Congress of The Sanitary Institute at Newcastle-on-Tyne in 1896, where he evinced the greatest interest in the proceedings, spoke at several of the meetings, and opened the Exhibition held in connection with the Congress. He presided at the twenty-first commemorative dinner of the Institute in July, 1897, which occurred during the busy period of the Jubilee celebrations, and on several occasions since then has taken the chair at the annual dinners.

Especially to be remembered, however, are the signal services that His Royal Highness rendered during the early history of the Institute. In 1885 the Museum was in serious difficulties for want of funds, and Sir Douglas Galton wrote a letter to the *Times* calling attention to its need of support. On seeing this letter the Duke of Cambridge wrote to Sir Douglas Galton, asking if he could help in any way to reinstate the Museum, and forthwith took an active part in furthering the success of a public meeting at the Mansion House, which he not only attended, but where he personally urged the importance of the undertaking, with the result of an accretion of funds which rescued the Museum and enabled it to be continued as the present successful and valuable public institution which is contributing to the sanitary welfare of the country.

The Sanitary Institute, whilst, like many other public institutions, deploring the loss of the Royal President, feels that its long period of active work in the past and its anticipation for the future has been materially influenced by the guidance and direction of the great man who, full of years (nearly eighty-five) and of honour, has passed away. The office vacated will not be an easy one to fill, but the memory of his predecessor's valuable work will be a stimulating incitement to the next incumbent to endeavour to follow in the footsteps of the great Prince, who made his exalted position ancillary to furthering the progress and welfare of an institution which, under his guidance, has become of great importance to the well-being of mankind.

The memory of the late Duke will long be preserved among scientific men, and his name will be associated with those of other great leaders in hygiene-work, which has resulted in the prolongation of life, the enhancement of the physical and, with it, the moral well-being of the human race. The Duke conferred great benefits on the nation, not only in his military capacity, but as a supporter of all those departments of science and art which contribute to human progress.

It was well said in Westminster Abbey by Canon Henson, "It is a

great thing to say in summary of a career, lived throughout its whole course in the widest publicity and protracted to the extreme verge of human life, that it was the life of a typical Englishman, and as such commanded the affectionate respect of a nation which, beyond other nations, venerated sincerity, duty, and religion"; and by the leader in the *Times* of March 18th, "What public life will miss in him is the spectacle of a bluff, loyal, hearty, English gentleman, who carried a soldier's sense of duty into much more than his military occupations."

Such, indeed, was the character of the Royal Prince whose loss as its President The Sanitary Institute has to mourn, and whose memory will be cherished by the Institute in the growth and evolution of which he took so great a part.

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